

Operator's Manual

Magic 2200 Digital Ultrasonic Diagnostic Imaging System

[Basic Volume]

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Preface

To ensure safe and correct operation of the system, carefully read and understand this operator's manual before operating the system.

For this volume of operator's manual, the issued date is 2009-03.

Product Information

Product name: Digital Ultrasonic Diagnostic Imaging System

Model: Magic 2200

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Structure of Operator's Manual

This manual mainly describes the structure, functions, installation, operation, maintenance of the system.

This manual has two volumes.

- Basic volume – describes the structure, functions, operations and maintenance of the system.
- Advanced volume – describes the preset and measurements in detail.

Besides this manual, the system is equipped with manual(s) of related transducer(s). The transducer's manual mainly describes the structure, operation, cleaning and disinfection of the corresponding transducer.

Symbols in Operator's Manual

The following table explains the safety symbols that may be used in this manual.

Symbol	Signification
 DANGER:	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING:	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION:	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTE:	Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Labels and Symbols on System

The following table explains the labels and symbols attached on the system.

Label or Symbol	Signification
	Indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the system.
	(a) Cautions that the system must not be used around flammable gasses. (b) Urges Caution related to handling of the transducers. For handling of the transducers, refer to the transducers' manuals.
	Cautions that the system must not be removed covers because the high voltage may cause electric shock.
	Serial number
	Date of manufacture
	Manufacturer
	Type-BF applied part
	Indicates the points requiring attention. Be sure to read the operator's manual concerning these points before using the system.
	AC (alternating current)
	Power switch OFF
	Power switch ON
	Ethernet port
	Video output
	USB port
	VGA port
	Equipotential terminal
	Fuse
	Transducer socket A
	Transducer socket B
	Brightness of the display
	Contrast of the display
	Mark showing how to adjust a value (to increase the value, rotate the corresponding knob clockwise; to decrease the value, rotate the corresponding knob counterclockwise)

Conventions

This manual uses the following way to mark keys on the control panel and words displayed on the screen.

- Keys on the control panel are marked with < >. For example, <Back> represents the “Back” key on the control panel.
- Words displayed on the screen are marked with []. For example, [B MEAS] represents the name of the “B MEAS” menu.

Figures

Depending on the software version, preset, options and so on, the figures in this manual may appear different from what you see from your system.

The figures in this manual are only for reference or explanation.

Safety Precautions

Be sure to observe the following safety precautions.

⚠ DANGER: Do not use flammable gasses such as anesthetic gas, oxygen or hydrogen, or flammable liquids such as ethanol, near the system, because there is danger of explosion.

⚠ WARNING:

1. The system is veterinary use only. Only medical personnel fully trained in clinical examination techniques can use the system.
2. Connect the power plug of the system to the wall receptacle properly grounded and meeting the ratings indicated on the rating nameplate.
3. When the system is connected with other equipments, be sure to connect their equipotential terminals before inserting any of their power plugs into a receptacle, and also, be sure to remove the power plugs from receptacles before disconnecting the equipotential terminals.
4. Use peripherals and optional parts provided with the system or recommended. Use cables provided with the system. Use other peripherals or cables may degrade system performance or even cause electric shock.
5. Do not connect the system to receptacles that control current to devices such as life-support systems and are equipped with the same circuit breakers and fuses as those of the system. If the system malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the building's supply circuit may be tripped.
6. No waterproof device is applied to the system. Do not use the system in any place with the possibility of water ingress. There is risk of electric shock if any water is sprayed on or into the system.
7. Use the system only in the environment specified in this manual.
8. Use transducers specified in this manual. Using transducers not specified in this manual may damage the system and transducer or even cause an accident such as a fire.

⚠️WARNING:

9. Use the transducer carefully. In case that the animal contacts the scratched transducer surface, immediately stop using the transducer and contact our company's Customer Service Department or your local distributor. Using scratched transducer may cause electric shock.
10. If finding any abnormality in the system or transducer during the scan, stop scanning immediately and turn off the system.
11. The system and accessories are neither disinfected nor sterilized before they are sold. Disinfect or sterilize transducers and needle-guided brackets as the transducers' manuals describe before using them.
12. After disinfecting or sterilizing accessories, thoroughly clear chemicals from the accessories. Residual chemicals may damage the accessories and cause injury.
13. Do not let the animal contact the system or other equipments. If the system or other equipments are defective, electric shock may occur.
14. Do not subject transducers to knocks. Using defective transducers may cause electric shock.
15. Do not open the shell or panel. Opening the shell or panel when the system is connected to the receptacle may cause short circuit or electric shock.
16. Do not use the system at the same time when using equipment such as an electro-surgical unit, high-frequency therapy equipment or a defibrillator, etc.
17. Before moving the system, power it off, close the control panel and then remove all connections (including connections to transducers). Then hold the system's handle to move the system to a proper location carefully.
18. Before cleaning the system, power it off and remove the power plug from the receptacle to avoid electric shock.
19. To avoid system damage or electric shock, do not remove the power plug from the receptacle before turning off the system.
20. To avoid equipment damage or electric shock, do not remove the power plug from the receptacle before turning off the peripheral.
21. To avoid system or printer damage or electric shock, do not connect/disconnect printer's data cable before turning off the system and printer.

⚠WARNING: 22. Accessory equipments connected to the system's analogue and digital interfaces must be complied with the relevant IEC standards (e.g., IEC 60950 Information Technology Equipment standard and IEC 60601-1 Medical Electrical Equipment standard). Furthermore all configurations should comply with the standard IEC60601-1-1. Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of IEC60601-1-1. If in doubt, consult our company's Customer Service Department or your local distributor.

23. Use ultrasound gel complying with local regulations.

⚠CAUTION:

1. This manual does not describe clinical examination techniques. Selection of proper clinical examination technique must be based on specialized training and clinical experience.
2. There is no risk of high-temperature burns during routine ultrasound examinations. To prevent high-temperature burns, do not apply the transducer to the same spot on the animal for a long time. Apply the transducer only for as long as required time for diagnosis.
3. Ensure the system date and time are consistent with current date and time. If they are not consistent, misdiagnosis may occur.
4. Always keep the system dry. Do not move the system quickly from a cold place to a warm one. Condensation or water drops formed may cause short circuit.
5. If the circuit breaker is tripped or the fuse is blown, it indicates that the system or peripherals have problems. In these cases, do not repair by yourself but contact our company's Customer Service Department or your local distributor.
6. Do not place any object on the system.
7. Ensure other equipments are secured before moving the system. Otherwise, the equipments may fall and cause injury.
8. Ensure proper measurement targets and images and measurements are performed in valid image area. Incorrect measurement results may cause misdiagnosis.
9. Prolonged or repeated use of the keys and trackball on the control panel may result in hand or arm nerve disorders. Observe the local safety/health regulations.

10. Use the USB storage device complying with local regulations.

NOTE:

1. Do not use the system in the vicinity of strong electromagnetic field (such as the transformer), which may affect the performance of the monitor.
2. Using devices transmitting RF signals in the vicinity of the system may affect the system's performance. Do not use or take any devices intentionally transmitting RF signals such as cellular phones, transceivers and radio controlled products in the room placing the system.
3. Transport, store and use the system under the circumstance specified in this manual. Additionally, store and use the system in a clean location where there is no direct sunlight, no sudden changes in temperature, no condensation, few dust, no vibration, and far from heat generators.
4. After turning off the system, wait at least 10 seconds before turning it on again. Otherwise, failure may occur.
5. Before connecting/disconnecting the transducer, turn off the system or stop emitting (freeze the image). Otherwise, the system or transducer may malfunction.
6. After using the transducer, remove the gel on it and place it properly. Otherwise, water in the gel may enter the acoustic lens to adversely affect the performance and safety of the transducer.
7. If the system is used in a small room, the room temperature may rise. Proper ventilation must be provided.
8. The system must keep good elimination of heat. Do not cover radiation holes on the system.
9. Only engineers of our company or authorized by our company can replace the fuses.
10. Only perform operations described in this manual.
11. Do not modify system parameters. If it is necessary to change system parameters, contact our company's Customer Service Department or your local distributor.
12. Deterioration of electrical and mechanical safety characteristics (such as generation of a leakage current or deformation/abrasion of mechanical parts) and of image sensitivity and precision may occur over a period of time. Check and maintain the system periodically. To ensure system performance, it is recommended to sign a maintenance and service contract to avoid accidents and misdiagnosis.

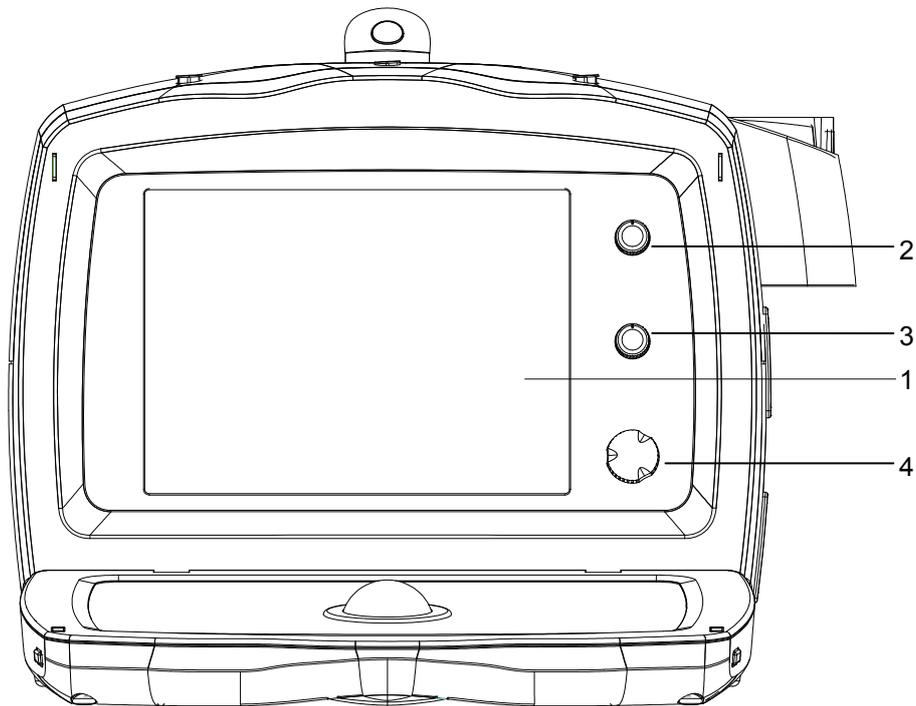
13. To dispose of the system or any part, contact our company's Customer Service Department or your local distributor first. Our company does not assume any responsibility for damage resulting from disposal of the system without consulting our company.
14. To ensure the safety of data, back up the data stored in the system to external storage devices. Since the data stored in the system may be lost due to improper operation or an accident.

1 System Basics

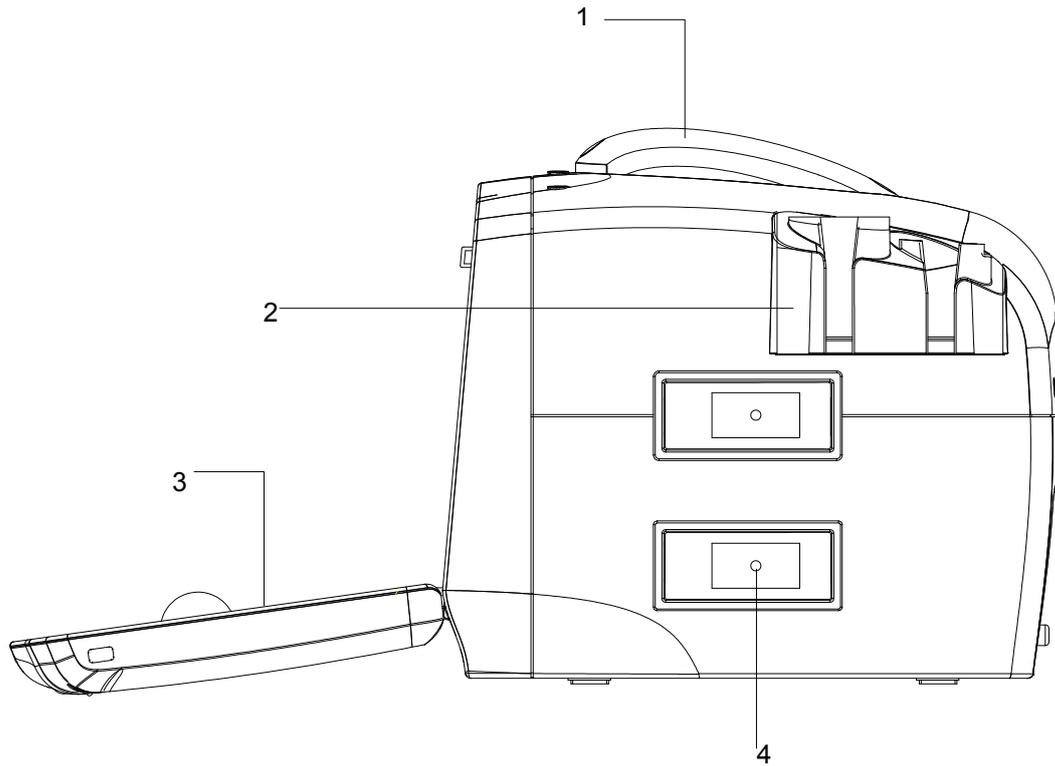
The system is intended for diagnosis of dogs, cats, equines, bovines, ovines and other animals.

This chapter introduces the system structure, control panel, basic elements of software interface and general operations of the elements.

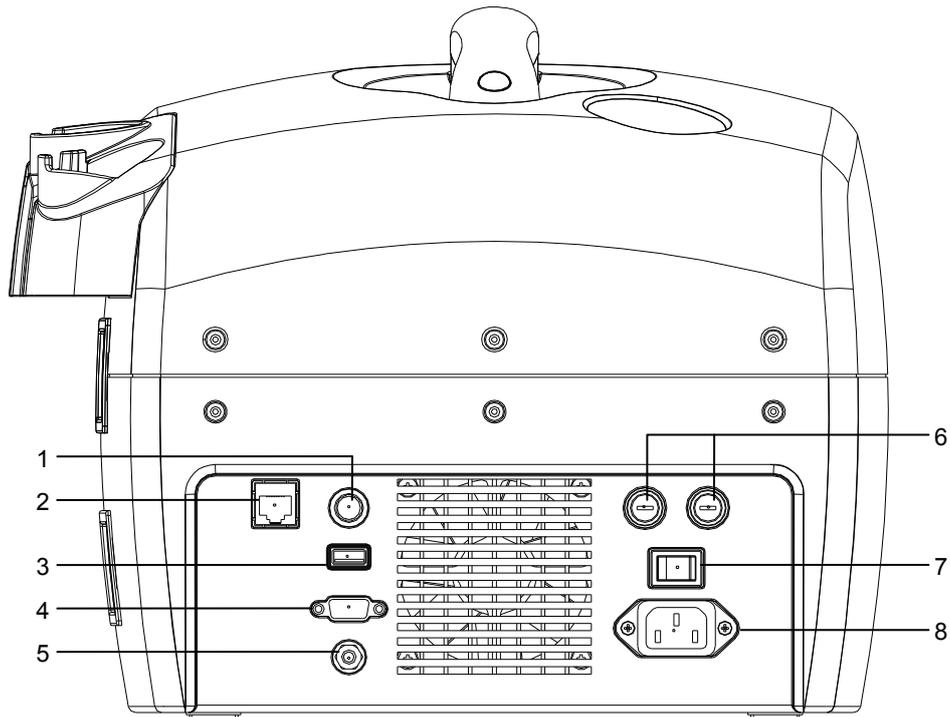
1.1 Structure



No.	Part	Description
1	Display	Displays images, parameters, etc.
2	Contrast knob	Adjusts contrast of the display.
3	Brightness knob	Adjusts brightness of the display.
4	Gain knob	Adjusts the overall gain of the image.

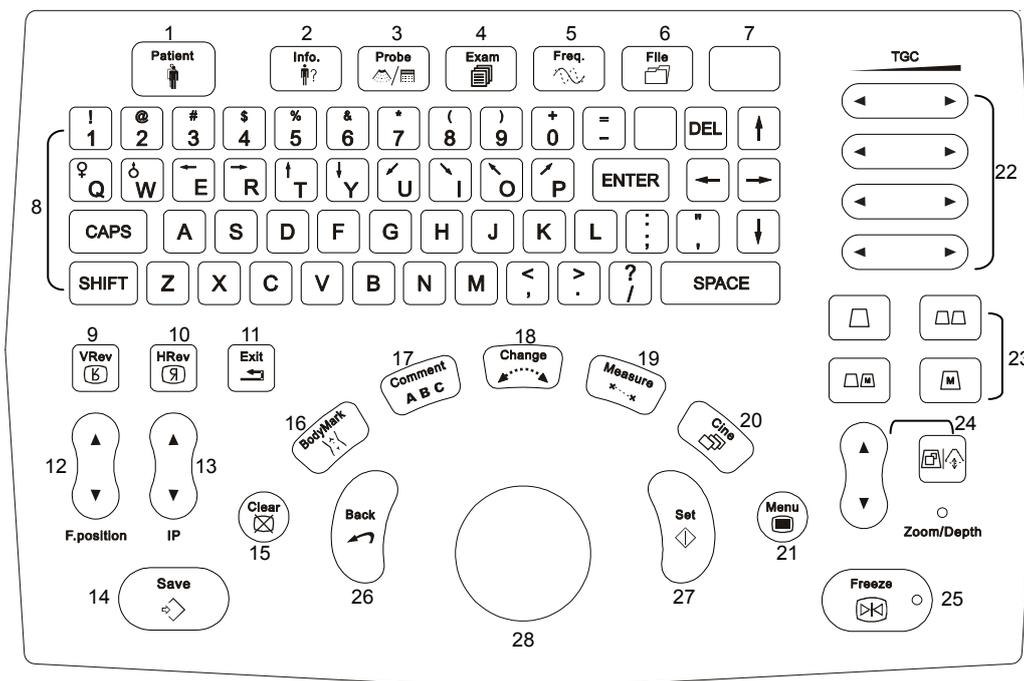


No.	Part	Description
1	Handle	Used to lift the system.
2	Transducer holder	Holds transducers.
3	Control panel	The interface for operating the system.
4	Transducer socket (one transducer socket for the basic configuration)	Connects transducers.



No.	Part	Description
1	Video output	Connects the data cable of video printer
2	Ethernet port (optional)	Connects the data cable of network
3	USB port	Connects the USB data cable
4	VGA port	Connects the display, etc.
5	Equipotential terminal	Used for equipotential connection.
6	Fuse ports (two)	Used to install fuses.
7	Power switch	Powers on/off the system.
8	Power input port	Connects the power cable of the system.

1.2 Control Panel



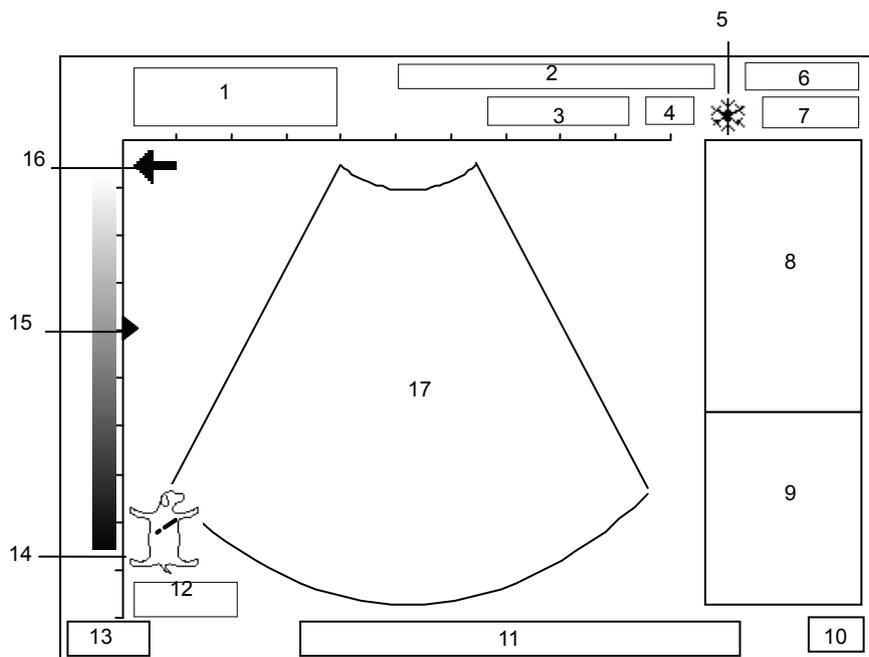
No.	Name	Function
1	Patient	Deletes information of the previous animal and prepares to examine a new animal
2	Info.	Enters/exits the [Animal Information Input] dialog box.
3	Probe	Switches to the other transducer in the real-time status. It is available only when two transducers are connected to the system.
4	EXAM	Enters/exits the [Exam Select] menu in the real-time status.
5	Freq.	Adjusts the transducer frequency in the real-time status.
6	File	Enters/exits the [FILE MENU] menu.
7	/	/
8	keyboard	Inputs characters.
9	VRev	Reverses the image vertically.
10	HRev	Reverses the image horizontally.
11	Exit	Exits the current status or returns.
12	F.position	Adjusts the position(s) of focus(es) in the real-time status.
13	IP	Selects a parameter combination of image process to adjust the display effect of image in the real-time status.
14	Save	Saves the image. After the key is pressed, the current image is saved in the preset storage device as a file with the preset format. See the "Preset" chapter in the Advanced Volume for details on the preset of file format and storage device.
15	Clear	Clears all comments, body mark, measurement calipers and general measurement data.
16	BodyMark	Enters/exits the [Body Mark] dialog box.
17	Comment	Enters/exits the comment status.

No.	Name	Function
18	Change	Exchanges the active end and the fixed one during a measurement; Or, enters/exits the comment library in the comment status.
19	Measure	Enters/exits the measurement status.
20	Cine	Enters/exits the manual cine in the frozen status.
21	Menu	Displays/hides the menu.
22	TGC	Adjusts the sensitivity of received ultrasound echoes according to the depth to the body surface in the real-time status.
23	Image mode keys	<p>You can press one of the key to select the corresponding image mode (B, B/B, M/B or M) in the real-time status.</p> <p>In the B/B mode, pressing <B/B> can switch the active window between the two B images.</p> <p>In the M/B mode, pressing <M/B> can switch between the active status and inactive status of B image.</p> <p> represents the B mode and is called in this manual.</p> <p> represents the B/B mode and is called <B/B> in this manual.</p> <p> represents the M/B mode and is called <M/B> in this manual.</p> <p> represents the M mode and is called <M> in this manual.</p>
24	Zoom/Depth	<p>Adjusts the image zoom or the image depth.</p> <p>The key on the right switches between the functions of zoom and depth adjustment; the keys on the left adjust the percentage of image zoom or the image depth.</p> <p>When the indicator is on, the system is in the zoom status and the percentage of image zoom can be adjusted;</p> <p>When the indicator is off, the image depth can be adjusted.</p>
25	Freeze	<p>Freezes/unfreezes the image.</p> <p>When the indicator is on, the system is in the frozen status.</p> <p>The acoustic output stops as the image is frozen.</p>
26	Back	Deletes the previous general measurement or comment, returns to the previous step of operation, selects parameters, etc.
27	Set	Fixes the position of cursor during a measurement, confirms the option, selects parameters, etc.
28	Trackball	Moves the cursor on the screen, etc.

1.3 Interface Elements and Operations

1.3.1 Interface

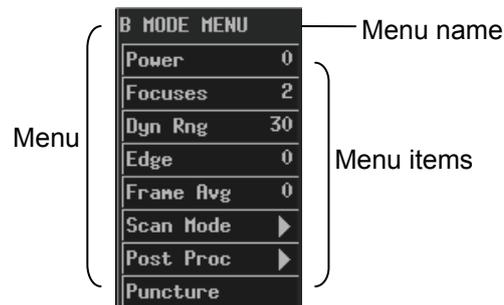
The following figure takes the interface of abdomen exam in the B mode as the example to introduce the software interface.



No.	Introduction
1	Hospital name, animal name and ID
2	Some of the current image parameters, including BG (B gain), MG (M gain), AP (acoustic power), IP (image process), FR (frame rate)
3	Transducer model
4	Current frequency of the transducer
5	Frozen symbol (when the image is frozen, the symbol appears)
6	Current date of the system (the date displayed on a frozen image is the date when the image is frozen)
7	Current time of the system (the time displayed on a frozen image is the time when the image is frozen)
8	Menu
9	Results of measurements and/or calculations
10	Input method
11	Help information of operation
12	Current image depth
13	Current exam mode
14	Body mark
15	Focus symbol
16	<p>The direction where the arrow indicates shows the initial scan position of the transducer (“←” means the first scan line from the left is the initial scan position of the transducer; “→” means the first scan line from the right is the initial scan position of the transducer).</p> <p>When scanning, ensure the transducer orientation corresponds to the arrow. See the operation manual of transducer for detail.</p>
17	Ultrasonic image

1.3.2 Menu

The following figure is an example of menu.

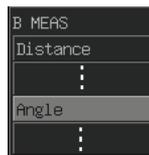


The menu items can be classified to the following types.

- Command menu items
- Number menu items
- Switch menu items
- Character menu items
- Submenu menu items

1.3.2.1 Command Menu Items

A command menu item makes the system to execute an action, such as popping up a dialog box or starting to measure.



To operate a command menu item, turn the trackball to move the cursor onto the menu item and then press <Set>.

1.3.2.2 Number Menu Items

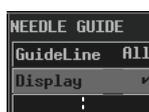
A number menu item adjusts the value of a parameter. The parameter name is on the left of the menu item and the value is on the right.



To operate a number menu item, turn the trackball to move the cursor onto the menu item and then press <Set> or <Back> once or more until the value you want appears (to increase the value, press <Set>; to decrease the value, press <Back>).

1.3.2.3 Switch Menu Items

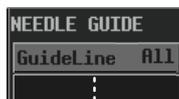
A switch menu item switches between the "on" and "off" status of a parameter. The parameter name is on the left of the menu item and the symbol of "√" or "x" is on the right ("√" represents "on" and "x" represents "off").



To operate a switch menu item, turn the trackball to move the cursor onto the menu item and then press <Set> or <Back>.

1.3.2.4 Character Menu Items

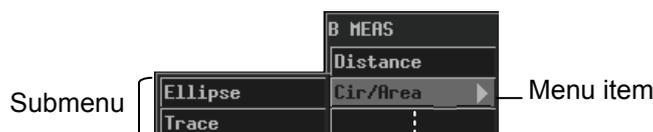
A character menu item adjusts the value of parameter. The parameter value is described in characters. The parameter name is on the left of the menu item and the value described in characters is on the right.



To operate a character menu item, turn the trackball to move the cursor onto the menu item and then press <Set> or <Back> once or more until the value you want appears.

1.3.2.5 Submenu Menu Items

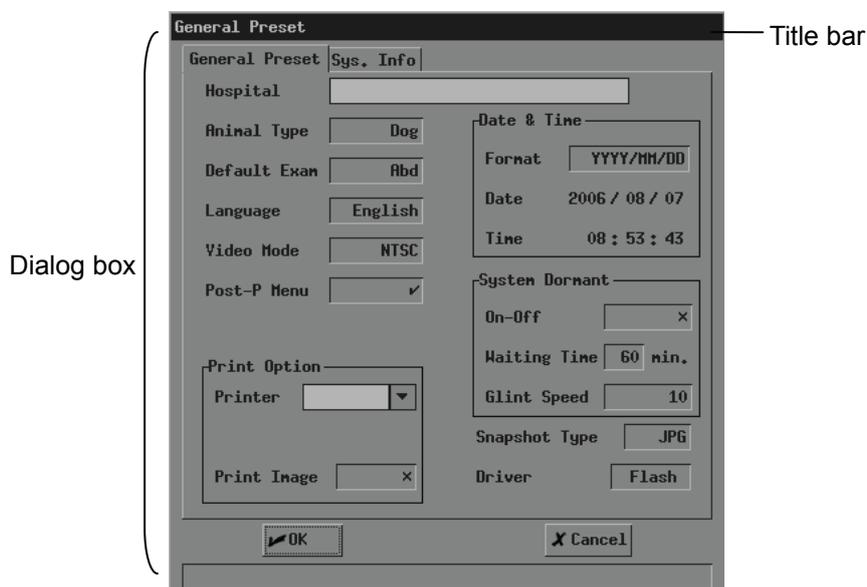
A submenu menu item opens a submenu.



To operate a submenu menu item, turn the trackball to move the cursor onto the menu item and its submenu pops up. Then, turn the trackball to move the cursor onto one item of the submenu and press <Set>.

1.3.3 Dialog Box

The following figure is an example of dialog box.



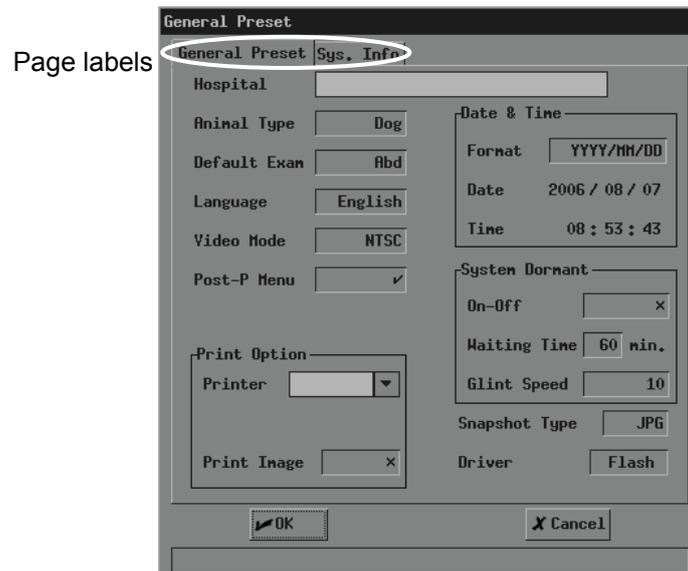
To move a dialog box,

- 1 Turn the trackball to move the cursor onto the title bar. The cursor is displayed as a "⤴". Press <Set>.
- 2 Turn the trackball. A rectangle whose size is the same as that of the dialog box is moving with the trackball. Place the rectangle where you want the dialog box is moved to.
- 3 If you want to move the dialog box here, press <Set>; if you do not want to move the dialog box, press <Back>.

A dialog box may have the elements as follows.

■ Page label

A page label marks a page when the contents of a dialog box are displayed in several pages.



To enter a page, turn the trackball to move the cursor onto the corresponding page label and then press <Set>.

■ Button

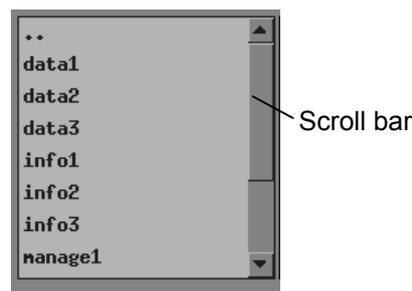
A button is used for some operation.



To click a button, turn the trackball to move the cursor onto the button and then press <Set>.

■ Scroll bar

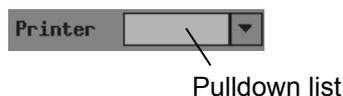
When not all of contents can be displayed in the current area, the scroll bar appears. Different contents can be displayed as the scroll bar is moving.



To drag the scroll bar, turn the trackball to move the cursor onto  or  and then press <Set> once or more until the content you want appears.

■ Pull-down list

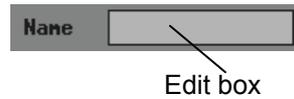
A pull-down list is used to select an option.



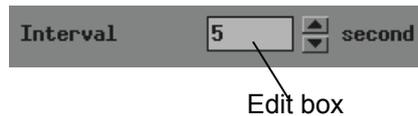
To select an option from a pull-down list, turn the trackball to move the cursor onto the pull-down list or  and then press <Set> to pop up the options. Then turn the trackball to move the cursor onto the option you want and then press <Set>.

■ Edit box

You can enter characters into an edit box. There are two kinds of edit boxes.



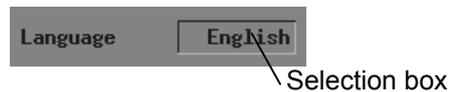
Turn the trackball to move the cursor onto the edit box shown above and the cursor is displayed as a "|". Then press <Set> and the cursor appears on the leftmost part of the edit box. After that, you can enter characters into the edit box.



To enter characters into the edit box shown above, turn the trackball to move the cursor onto  or  and then press <Set> once or more until the value you want appears.

■ Selection box

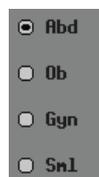
A selection box is used to select an option.



To select an option, turn the trackball to move the cursor onto the selection box and then press <Set> or <Back> once or more until the option you want appears.

■ Radio button

A radio button is used to select one option from several options.



To select an option, turn the trackball to move the cursor onto the option and then press <Set> to select it. The option selected is marked with .

■ List

A list displays multiple contents in a line.

Name	Type	Modify Time
26173846	BMP	2006-07-26 17:39
27090407	CIN	2007-07-27 09:04

To select an item in a list, turn the trackball to move the cursor onto the item you want and then press <Set>.

2 System Connection

This chapter introduces how to connect the power supply, equipotential terminal, transducers and peripherals to the system.

NOTE: Before connecting the system, put the system in a proper place and ensure at least 20cm of clearance at the back and sides of the system.

The transportation, storage and operating environments of the system must meet requirements listed in the appendix. Besides, store and use the system in a clean location where there is no direct sunlight, no sudden changes in temperature, no condensation, few dust, no vibration, and far from heat generators.

2.1 Connecting Power Supply

Connect the power plug of the system to an outlet meeting the following requirements:

- Voltage: 100-240VAC
- Frequency: 50/60Hz
- Output power is greater than 100-240VAC 1.5-0.8A.
- Three-wire power cord, properly grounded

⚠WARNING: Do not connect the system to outlets with the same circuit breakers and fuses that control current to devices such as life-support systems. If the system malfunctions and generates an overcurrent, or when there is an instantaneous current at power ON, the circuit breakers and fuses of the building's supply circuit may be tripped.

2.2 Connecting Equipotential Terminal

When the system is connected with other equipments such as printers, be sure to connect the equipotential terminal of the system and those of other equipments with lead wire.

⚠WARNING: When the system is connected with other equipments, be sure to connect their equipotential terminals before inserting any of their power plugs into a receptacle, and also, be sure to remove the power plugs from receptacles before disconnecting the equipotential terminals.

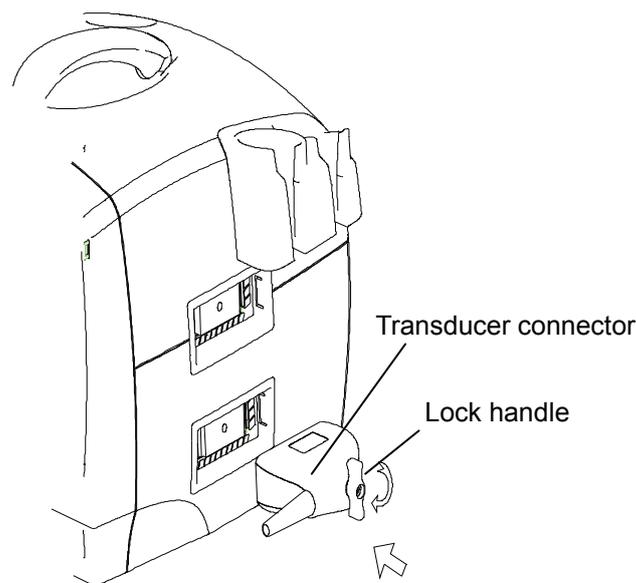
2.3 Connecting Transducer

⚠ WARNING: Use only transducers specified in this manual. Otherwise, the system and transducer may be damaged or an accident such as a fire may occur.

Ensure the transducer and its connector and cable are intact before connecting it to the system. Using defective transducers may cause electric shock.

NOTE: Before connecting or disconnecting a transducer, be sure to turn off the system or stop emitting (freeze the image). Otherwise, the system or transducer may be damaged.

- To connect a transducer
 - 1 Turn off the system or freeze the image.
 - 2 Put the lock handle to the position shown in the figure below.
 - 3 Plug the transducer connector into the transducer socket on the system.
 - 4 Turn the lock handle 90° clockwise.



- To disconnect a transducer
 - 1 Turn off the system or freeze the image.
 - 2 Turn the lock handle 90° counterclockwise.
 - 3 Remove the transducer connector from the transducer socket on the system.

2.4 Connecting Footswitch

The footswitch is optional.

The function of stepping on the left key of footswitch is the same as pressing <Save>; the function of stepping on the right key of footswitch is the same as pressing <Freeze>.

- To connect a footswitch
 - 1 Plug the USB connector of the footswitch into the USB port on the rear of the system.

- To disconnect a footswitch
 - 1 Remove the USB connector of the footswitch from the USB port on the rear of the system.

2.5 Connecting Peripherals

NOTE:	To operate peripherals, refer to their manuals.
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- To connect a USB storage device
 - 1 Plug the USB connector of a storage device into the USB port on the rear of the system.
 - 2 As the USB storage device is connected to the system, “” appears on the lower right corner of the screen.

- To disconnect a USB storage device
 - 1 Move the cursor onto “” and press <Set>. The following dialog box pops up.



- 2 Click [OK].
- 3 After “” disappears, remove the USB connector from the USB port.

NOTE:	If you remove the USB connector from the USB port directly without performing the steps above, the USB storage device and the system may be damaged.
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- To connect a video printer
 - 1 Turn off the system and the printer.
 - 2 Use the data cable of printer to connect the “VIDEO IN” port on the printer and the video output port on the system.
 - 3 Use the power cord of printer to connect the power input port on the printer and the receptacle.

- To connect a graph/text printer
 - 1 Turn off the system and the printer.
 - 2 Use the USB data cable of printer to connect the USB ports on the printer and on the system.
 - 3 Use the power cord of printer to connect the power input port on the printer and the receptacle.

2.6 Using the Mobile Power

NOTE: When using the ultrasonic system with the mobile power, make sure the environment meets the requirements of the ultrasonic system.

For details about the operations, please refer to the operator's manual of the mobile power.

3 Startup/Shutdown

This chapter introduces procedures of startup and shutdown of the system.

3.1 Startup

- 1 Before the startup, complete the following checks:
 - The ambient temperature, humidity and atmospheric pressure meet requirements listed in the appendix.
 - The system is placed in a clean location where there is no direct sunlight, no sudden changes in temperature, no condensation, few dust, no vibration, and far from heat generators. Ensure at least 20cm of clearance at the back and sides of the system.
 - The system and peripherals have no deformation, damage or dirt. If necessary, clean the system (see the “System Maintenance” chapter for details).
 - There are no obstacles in the area where the system can be moved and near the radiator holes of the system.
 - All power cables and connection cables are intact.
 - The transducer(s) has(have) been cleaned and disinfected (see transducers’ manuals for details).
 - The transducer(s), connector(s) and cable(s) are intact.
 - The transducer(s) is(are) connected to the system.
 - Peripherals to be used are connected to the system.
 - All connections are secure.
- 2 Ensure the power plug of the system is connected to an outlet meeting requirements. For peripherals to be used, ensure their power plugs are connected to receptacles meeting requirements.
- 3 Turn on the system. For peripherals to be used, turn them on.

- 4 After the startup, check the system as follows.

⚠WARNING: If you find any abnormality, turn off the system and refer to “13.3 Troubleshooting” to see if the section lists any solution for the problem. If not, contact our company’s Customer Service Department or your local distributor.

- Check whether the startup is normal.
- Check whether the system has any abnormal noise or smell or is overheated.
- Check by hand whether the surface of transducer is overheated.

⚠WARNING: Using overheated transducers may burn animals.

- Check whether the keys and trackball on the control panel can work properly.
- Check whether the image is normal.
- Check whether any error information appears.
- Check whether the system date and time are the same as current ones and whether they are displayed correctly. If not, modify the system date and time (see the “Preset” chapter in the Advanced Volume for details).

⚠CAUTION: If the system date and time are not the same as current ones, misdiagnosis may occur.

3.2 Shutdown

- 1 Put the transducer(s) on the transducer holder.
- 2 Turn off peripherals connected to the system.
- 3 Turn off the system.
- 4 If the system is not to be used for a period of time, remove power plugs of the system and peripherals from receptacles.
- 5 Clean and disinfect the transducer(s) (see the transducers’ manuals for details) and keep the transducer(s).

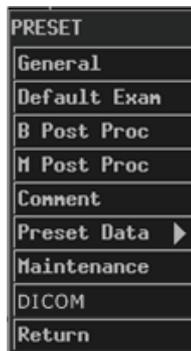
NOTE: The system can be turned on again at least 10 seconds after it is turned off.

4 Preset

This chapter briefly describes how to preset the system. Refer to the Advanced Volume for details.

The preset function is used to set the operating status, configuration parameters of each exam mode, post process and others. The system runs automatically with the preset parameters after each startup. Before examining animals, ensure proper parameters have been preset.

- 1 Press <EXAM> and then select [Preset] in the [Exam Select] menu. The [PRESET] menu pops up.



- 2 Preset parameters.
- 3 After all preset is completed, press <Exit> or select [Return] in the [PRESET] menu to close the [PRESET] menu. The system runs with the modified preset data.

Note that the modified preset data takes effect only after the preset status exits using the above method.

5 Beginning Exam

This chapter describes the general procedure before scanning an animal.

⚠CAUTION: Before examining an animal, press <Patient> to update the animal information. Otherwise, the animal information does not correspond to the animal data and misdiagnosis may occur.

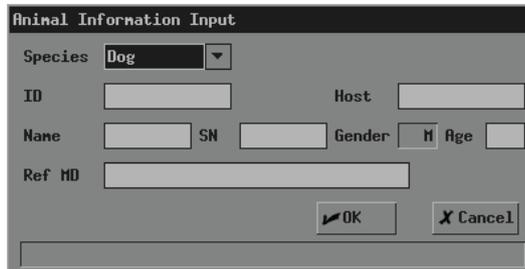
5.1 Inputting Animal Information

⚠CAUTION: The correct obstetric measurement menu is entered only after the animal species is selected properly in the [Animal Information Input] dialog box.

Although you can scan an animal without inputting the animal information, it is recommended to input animal information before scanning the animal to avoid misdiagnosis.

The system identifies an animal via the ID. Input correct IDs to avoid misdiagnosis.

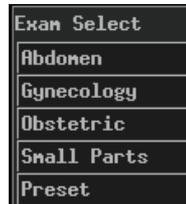
- 1 Press <Patient>, or move the cursor onto the “Name” or “ID” on the screen and then press <Set>. The [Animal Information Input] dialog box pops up.



- 2 Input animal information in the [Animal Information Input] dialog box.
In the dialog box,
 - ID: It must be input. The system identifies an animal via the ID. You can enter letters, numbers (0-9) and “-” and cannot exceed 12 characters.
 - Host: Enter the name of animal’s host. You can enter 12 characters at most.
 - Name: Enter the animal’s name. You can enter 8 characters at most.
 - SN: Enter the serial number of animal. You can enter 8 characters at most.
 - Age: Enter the animal’s age. The range is 0-150.
 - Ref MD: Enter the diagnostic conclusion independent of ultrasonic exam. You can enter 32 characters at most.
- 3 If you want to save the input information, click [OK]; if you want to save nothing, click [Cancel] or press <Patient> or press <Exit>.

5.2 Selecting Exam Mode

- 1 If the system is not in the exam mode you want, press <EXAM> to enter the [Exam Select] menu and then select the exam mode.



The system supports the following exam modes:

- Abdomen
- Gynecology
- Obstetric
- Small parts

5.3 Selecting Transducer

- 1 For the system connecting two transducers, if the current transducer is not the one you want, press <Probe> to switch to the other transducer.

5.4 Selecting Image Mode

- 1 If the current image mode is not the one you want, press , <M>, <B/B> or <M/B> to select the image mode.

The system supports the following image modes:

- B
- M
- B/B
- M/B

Adjusting M-mark Position

As entering the M/B mode, you can turn the trackball leftward or rightward to adjust the position of M-mark.

To adjust the position of M-mark again, follow the steps below.

- 1 Enter the [M MODE MENU] menu (if no menu is displayed, press <Menu>).
- 2 In the [M MODE MENU] menu, select [M-Mark].
- 3 Turn the trackball leftward or rightward to adjust the position of M-mark.

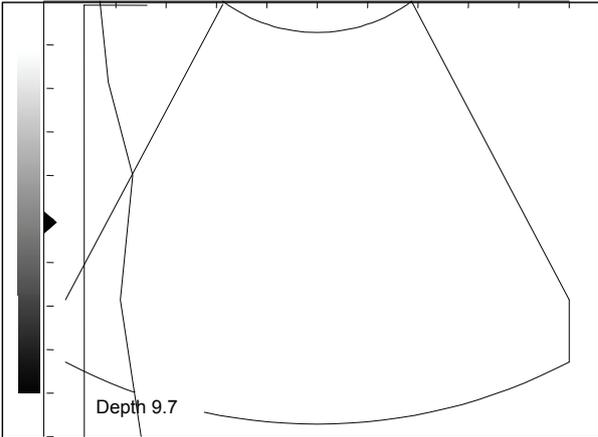
6 Image Control and Adjustment

This chapter describes how to control and adjust the image.

6.1 Adjusting Image Parameters

To obtain a better image, it is recommended to rotate the brightness knob and contrast knob to make the marks on them in the top position.

Parameter	Description
B/M gain	<p>Adjusting the B/M gain is to adjust the gain of receiving system and the signal sensitivity of B and M images.</p> <p>The B gain (BG) and M gain (MG) are displayed on the upper part of the screen.</p> <p>You can only adjust the parameter on real-time images.</p> <ul style="list-style-type: none">■ To adjust the parameter, turn the gain knob. The B gain and M gain are adjusted simultaneously. The range is 0dB-98dB. <p>It is recommended to adjust the B/M gain to 34dB. When B/M gain is 34dB, you can obtain a better image.</p>
Acoustic power	<p>The acoustic power is the emitting power of the transducer. You should select proper acoustic power according to the actual condition and the principle of acoustic power.</p> <p>You can only adjust the parameter on real-time images.</p> <ul style="list-style-type: none">■ To adjust the parameter, enter the [B MODE MENU] menu and then set [Power] in the menu. The range is 0-7 (0 represents the minimal acoustic power and 7 represents the maximal).
Transducer frequency	<p>You can only adjust the parameter on real-time images.</p> <ul style="list-style-type: none">■ To adjust the parameter, press <Freq.> once or more.

Parameter	Description
TGC	<p>TGC (time gain control) means using the gain compensation curve separated to several segments by depth to optimize the image. Four groups of TGC keys adjusts the current image by segments.</p> <p>The TGC curve appears on the left of screen when it is being adjusted and changes as a TGC key is pressed, which is shown in the figure below. After the adjustment stops, the TGC curve will disappear automatically.</p> <p>You can only adjust the parameter on real-time images.</p>  <p>■ To adjust the parameter, press the TGC keys on the control panel.</p>
Number of focuses	<p>The B image has 1-4 focuses. The number of focuses also lies on the depth. The M image has only one focus.</p> <p>You can only adjust the parameter on real-time B images.</p> <p>■ To adjust the parameter, enter the [B MODE MENU] menu and then set [Focuses] in the menu.</p>
Focus position	<p>When the focus position is adjusted, one or more focuses moves on the current image simultaneously.</p> <p>You can only adjust the parameter on real-time images.</p> <p>■ To adjust the parameter, press <F.position>.</p>
Depth	<p>The scan depth of low frequency transducers is 4.31-24.8cm; The scan depth of high frequency transducers is 2.16-11.9cm.</p> <p>You can only adjust the parameter on real-time images.</p> <p>■ To adjust the parameter, press the keys on the left of <Zoom/Depth> as the indicator of <Zoom/Depth> is off.</p>
Dynamic range	<p>The dynamic range adjusts the contrast resolution of B or M images and compress or expand their display range of gray scale.</p> <p>You can only adjust the parameter on real-time images.</p> <p>■ To adjust the parameter of B image, enter the [B MODE MENU] menu and then set [Dyn Rng] in the menu; to adjust the parameter of M image, enter the [M MODE MENU] menu and then set [Dyn Rng] in the menu. The range is 30dB-90dB and the increment is 4dB.</p>

Parameter	Description
Edge enhancement	<p>The edge enhancement increases image profile to distinguish image boundary.</p> <p>You can only adjust the parameter on real-time images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter of B image, enter the [B MODE MENU] menu and then set [Edge] in the menu; to adjust the parameter of M image, enter the [M MODE MENU] menu and then set [Edge] in the menu. The range is 0-4 (0 represents no edge enhancement and 4 represents the maximal edge enhancement).
Frame average	<p>The frame average superimposes and averages adjacent B images to remove image noise and make image details clearer.</p> <p>You can only adjust the parameter on real-time B images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, enter the [B MODE MENU] menu and then set [Frame Avg] in the menu. The range is 0-7 (0 represents no frame average, and n (n=1-7) represents superimposing and averaging the adjacent (n+1) frames).
Scan mode	<p>The scan mode adjusts the density of scan lines of B images.</p> <p>You can only adjust the parameter on real-time B images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, enter the [B MODE MENU] menu and then switch between [Hi Frm Rate] and [Hi Density] in [Scan Mode] (Images of high density have better quality and those of high frame rate have higher frame rate).
M speed	<p>The M speed adjusts the refresh speed of M images.</p> <p>You can only adjust the parameter on real-time M images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, enter the [M MODE MENU] menu and then set [M Speed] in the menu. The range is 1-4 (1 represents the slowest scan speed and 4 represents the fastest).
M soften	<p>The M soften superimposes and averages scan lines of M images to remove image noise and make image details clearer.</p> <p>You can only adjust the parameter on real-time M images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, enter the [M MODE MENU] menu and then set [M Soften] in the menu. The range is 0-3 (0 represents no M soften and n (n=1-3) represents superimposing and averaging the successive (n+1) scan lines).

Parameter	Description
Post process	<p>The post process applies the gray correction to images to obtain images with optimum map.</p> <p>You can select a map from the eight maps, or adjust gray transform curve, gray rejection curve and γ correction.</p> <p>You can adjust the post process effect on real-time, frozen and cine images, on opened FRM, CIN files, and on their zoomed images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, see the following contents below this table for details. If [Post-P Menu] in the [General Preset] dialog box is set to “off” (see the “Preset” chapter in the Advance Volume for details), the gray transform, gray rejection and γ correction cannot be performed.
IP	<p>IP is an image process effect, which is a group of image process parameters including the dynamic range, edge enhancement and frame average.</p> <p>You can preset IP in the [PRESET] menu (see the “Preset” chapter in the Advance Volume for details).</p> <p>You can only adjust the parameter on real-time images.</p> <ul style="list-style-type: none"> ■ To adjust the parameter, press <IP>. The range is 1-8 (each represents an image process effect).

Note that if [Post-P Menu] in the [General Preset] dialog box is set to “off” (see the “Preset” chapter in the Advance Volume for details), the corresponding “post process” items in the [B MODE MENU], [M MODE MENU] and [FREEZE MENU] are not displayed and the gray transform, gray rejection and γ correction cannot be performed.

■ Gray map

There are eight gray maps, from Map1 to Map8. Each map is a post process effect, which is a group of gray transform curve, gray rejection curve and γ correction. Gray maps can be preset in the [B Post Process Preset] dialog box (see the “Preset” chapter in the Advance Volume for details).

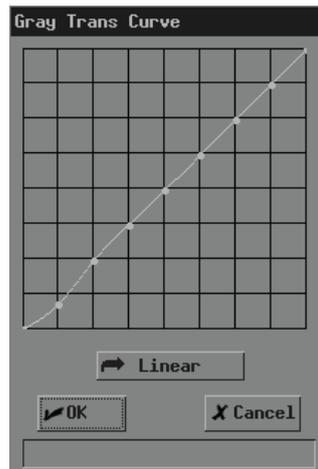
To adjust the gray map,

- 1 For real-time B images, enter the [B MODE MENU] menu.
For real-time M images, enter the [M MODE MENU] menu.
For frozen or cine images, or opened FRM or CIN files, enter the [FREEZE MENU] menu.
- 2 Set [Gray Map] in [Post Proc] or [B Post Proc] or [M Post Proc] (if [Post-P Menu] in the [General Preset] dialog box is set to “on”).
Or, set [Gray Map] (if [Post-P Menu] in the [General Preset] dialog box is set to “off”).

■ Gray transform

To adjust the gray transform curve,

- 1 For real-time B images, enter the [B MODE MENU] menu.
For real-time M images, enter the [M MODE MENU] menu.
For frozen or cine images, or opened FRM or CIN files, enter the [FREEZE MENU] menu.
- 2 Select [Curve] in [Post Proc] or [B Post Proc] or [M Post Proc]. The [Gray Trans Curve] dialog box pops up.



During the adjustment, if necessary, you can click [Linear] in the dialog box to set the curve to a 45° straight line.

- 3 Move the cursor to the node “•” you want on the gray scale curve and the cursor changes to “⊕”. Press <Set>.
- 4 Move the trackball and “•” moves with it. Move “•” to the position you want.
- 5 If you want to place “•” in the current position, press <Set>; if you want to cancel the operation to “•” and restore it to its original position, click <Back>.
- 6 If you want to move another node, return to the step 3.
- 7 If you want to save the setting, click [OK]; if you want to abandon the setting and restore the curve to the shape before adjustment, click [Cancel] or press <Exit>.

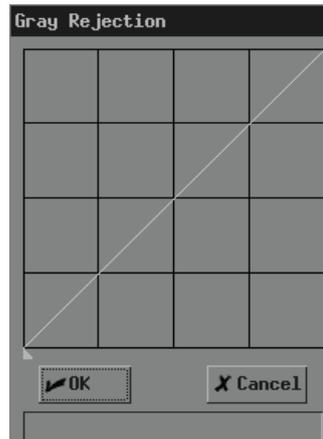
■ Gray rejection

The gray rejection rejects image signals lower than some gray scale.

To adjust the gray rejection curve,

- 1 For real-time B images, enter the [B MODE MENU] menu.
For real-time M images, enter the [M MODE MENU] menu.
For frozen or cine images, or opened FRM or CIN files, enter the [FREEZE MENU] menu.

- 2 Select [Rejection] in [Post Proc] or [B Post Proc] or [M Post Proc]. The [Gray Rejection] dialog box pops up.



- 3 Move the cursor to “▲” and the cursor changes to “↕”. Press <Set>.
- 4 Move the trackball and “▲” moves with it. Move “▲” to the position you want.
- 5 If you want to place “▲” in the current position, press <Set>; if you want to cancel the operations to “▲” and restore it to its original position, press <Back>.
- 6 If you want to save the setting, click [OK]; if you want to abandon the setting and restore the curve to the shape before adjustment, click [Cancel] or press <Exit>.

■ γ correction

The γ correction corrects non-linear distortion of images.

The γ correction parameter can be 0, 1, 2 or 3, respectively representing the γ coefficient is 1, 1.1, 1.2 or 1.3.

To adjust the γ correction parameter,

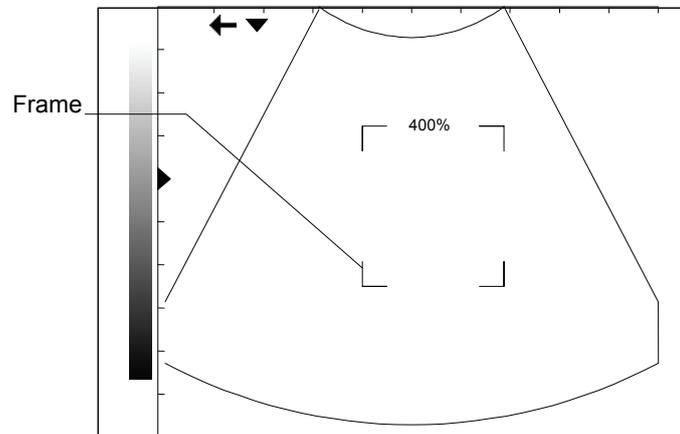
- 1 For real-time B images, enter the [B MODE MENU] menu.
For real-time M images, enter the [M MODE MENU] menu.
For frozen or cine images, or opened FRM or CIN files, enter the [FREEZE MENU] menu.
- 2 Set [γ] in [Post Proc] or [B Post Proc] or [M Post Proc].

6.2 Image Zoom

B images (including real-time, frozen and cine images, and opened FRM, CIN files) can be zoomed. The percentage of area zoom is 100%-400%.

- 1 In the B, B/B or M/B mode, press <Zoom/Depth>. The indicator lights up and a frame appears on the center of image.

Note that in the B/B mode, only the active window can be zoomed.



- 2 Move the trackball to move the frame to select the zoom center.
- 3 Press the keys beside <Zoom/Depth> to change the size of frame. The zoom percentage changes with it.
- 4 Press <Set> and the frame disappears. The zoomed image is displayed.
- 5 You can move the trackball to move the zoomed image.
- 6 Press the keys beside <Zoom/Depth> to change the zoom percentage of image.
- 7 Press <Set> to fix the center of zoomed image. The cursor appears.
- 8 Press the keys beside <Zoom/Depth> to change the zoom percentage of image.
- 9 Press <Zoom/Depth> or <Exit>. The indicator lights off, the zoom status exits and normal image is displayed.

6.3 Image Reverse

B images (including real-time, frozen, cine images, opened FRM, CIN files and zoomed images) can be reversed horizontally or vertically.

In the B, B/B or M/B mode, press <VRev> to reverse the image vertically, and press <HRev> to reverse the image horizontally.

7 Cine

This chapter introduces the cine and its operation method.

⚠CAUTION: Before examining an animal, press <Patient> to update the animal information and clear the cine memory. Otherwise, the animal information does not correspond to the animal data and misdiagnosis may occur.

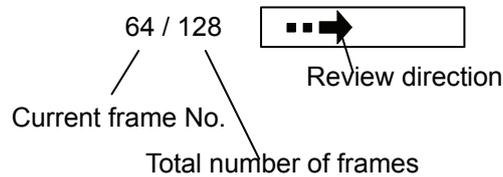
The system supports only the cine of B images.

Real-time images (including zoomed images) are automatically stored into the cine memory by the system. They are stored frame by frame and in the sequence of time. After the image is frozen, images prior to the frozen one can be reviewed. This function is called cine.

The cine must be performed in frozen status. Turning off the system, unfreezing the image or pressing <Patient> will clear the cine memory.

7.1 Cine Indicator

In the cine, the cine indicator shown in the figure below is displayed on the bottom of screen. In it, the numbers are the current frame No. and the total number of frames in the cine memory, and the arrow indicates the review direction.



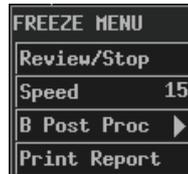
7.2 Manual Cine and Auto Cine

The cine includes the manual cine and auto cine. The manual cine is the default.

■ General procedure of cine

- 1 In the B, B/B or M/B mode, press <Freeze> to enter the manual cine. The [FREEZE MENU] menu is displayed (if no menu is displayed, press <Menu>).

Note that in the B/B mode, only the window that is active when <Freeze> is pressed has the cine.



- 2 If you want to perform the auto cine, press <Cine> or <Exit> to exit the manual cine.

Note:

(1) You can operate the [FREEZE MENU] menu only after exiting the manual cine.

(2) To enter the manual cine again, press <Cine>. Pressing <Cine> can switch between entering and exiting the manual cine.

- 3 Perform the manual cine or auto cine. See the following contents for details.
- 4 You can perform post process, measurements, comments and body mark on a cine image.
- 5 After all the operation is completed, press <Freeze> to unfreeze the image.

■ Procedure of manual cine

- 1 Enter the manual cine.
- 2 Turn the trackball leftward or rightward and the images are displayed one by one (turning the trackball leftward can display the images in the ascending sequence of frame No.; turning the trackball rightward can display the images in the descending sequence of frame No.).

■ Procedure of auto cine

- 1 Exit the manual cine.
- 2 If you want to set speed for the auto cine, set [Speed] in the [FREEZE MENU] menu.
- 3 Click [Review/Stop] in the [FREEZE MENU] menu to begin the auto cine.
During the auto cine, you can modify [Speed] in the [FREEZE MENU] menu.
- 4 Click [Review/Stop] in the [FREEZE MENU] menu to stop the auto cine.

8 Measurements

This chapter briefly introduces measurements on B and M images. Refer to the Advanced Volume for details.

⚠WARNING: Ensure proper measurement targets and images and measurements are performed in valid image area. Incorrect measurement results may cause misdiagnosis.

⚠CAUTION: Shutting down the system or pressing <Patient> will delete all images not saved and all animal data and measurement data on the screen.

For a measurement in frozen status, unfreezing the image will clear measurement calipers and general measurement data.

During a measurement, switching to another measurement menu from [Others] or to another exam mode will clear measurement calipers and general measurement data.

8.1 Measurement Menu

For B images, measurement menus are:

- [B MEAS]: general measurements on B images.
- [OB MEAS DOG]: calculates GA and EDD for dogs on B images.
- [OB MEAS CAT]: calculates GA and EDD for cats on B images.
- [OB MEAS EQUINE]: calculates GA and EDD for equines on B images.
- [OB MEAS BOVINE]: calculates GA and EDD for bovines on B images.
- [OB MEAS OVINE]: calculates GA and EDD for ovines on B images.
- [OB MEAS OTHERS]: calculates GA and EDD for other animals on B images.

For M images, measurement menu is:

- [M MEAS]: general measurements on M images.

8.2 General Procedure of Measurements

Measurements can be performed on real-time, frozen, cine images, on opened FRM, CIN files, and on their zoomed images.

- 1 Press <Measure> to enter the measurement status. The corresponding measurement menu will be displayed (if no menu is displayed, press <Menu>).
- 2 Select items to perform measurements and calculations.
- 3 To switch to another measurement menu for the current animal species, you can
 - Press <EXAM> to select the exam mode you want; for the system connecting two transducers, select the proper transducer; then press <Measure>.
 - Or, select the measurement you want in [Others] of the current measurement menu.
- 4 After all measurements are completed, you can exit the measurement status by
 - Pressing <Measure> or <Exit>.
 - Or, directly pressing another key such as <Comment>, <BodyMark> or <File>.

9 Comment

This chapter introduces how to add, modify and delete comments.

⚠WARNING: Be sure to add correct comments. Otherwise, misdiagnosis may occur.

9.1 Entering Comment Status

- 1 Press <Comment> to enter the comment status. The cursor is displayed as a “|”.

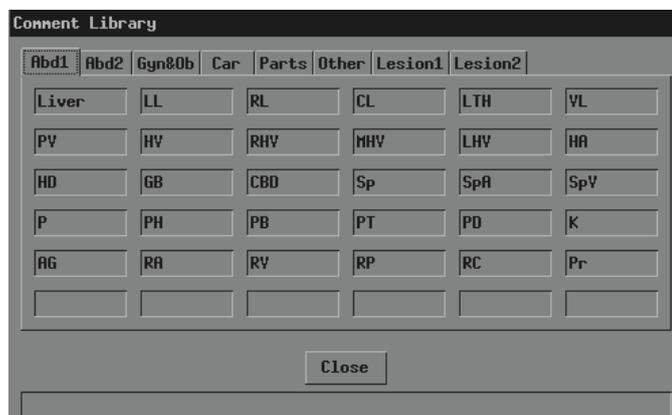
9.2 Adding Comments

You can add comments on real-time, frozen and cine images, on opened FRM, CIN files, and on their zoomed images.

You can add comments in any image mode.

Comments can be input from the keyboard and the comment library, and arrows can also be added in.

- To add a comment from the keyboard
 - 1 Enter the comment status.
 - 2 Turn the trackball or press <→>, <←>, <↑> or <↓> to move the cursor where you want the comment to be located.
 - 3 Input a comment from the keyboard.
 - 4 If you want to adopt the comment, press <Set>;
If you want to adopt the comment and put the cursor to the next line, press <ENTER>.
- To add a comment from the comment library
 - 1 Enter the comment status.
 - 2 Turn the trackball or press <→>, <←>, <↑> or <↓> to move the cursor where you want the comment to be located.
 - 3 Press <Change>. The [Comment Library] dialog box pops up and the page corresponding to the current exam mode is displayed.



- 4 If none of the comments in the [Comment Library] dialog box is what you need, click [Close] or press <Change> or press <Exit> to close the [Comment Library] dialog box. The operation is over.

If none of the comments in the current page is what you need, enter other pages to find it. Then go to the next step.

- 5 Move the cursor onto the comment you want and then press <Set>. The comment appears on the screen.

You can edit the comment (add characters, delete characters, etc.) or return to the step 3 to add another comment from the library.

- 6 If you want to adopt the comment, press <Set>;
If you want to adopt the comment and put the cursor to the next line, press <ENTER>.

■ To add an arrow

Arrows can be added to an image to mark what should be emphasized.

- 1 Enter the comment status.
- 2 Turn the trackball or press <→>, <←>, <↑> or <↓> to move the cursor where you want the comment to be located.
- 3 Press <Set> to add an arrow. The arrow has a frame, which means the arrow can be moved, its orientation can be adjusted and so on.
- 4 If you want to move the arrow, turn the trackball.
If you want to adjust the orientation of arrow, press <→>, <←>, <↑> or <↓> (pressing <→> or <↓> can rotate the arrow clockwise; pressing <←> or <↑> can rotate the arrow counterclockwise).
- 5 If you want to adopt the arrow, press <Set>;
If you want to cancel the arrow, press <Back>.

9.3 Moving Comments

■ To move a comment (excluding arrow)

- 1 Enter the comment status.
- 2 Move the cursor onto the comment to be moved. The cursor changes to “”.
- 3 Press <Set>. The selected comment has a gray background.
- 4 Turn the trackball and a frame whose size is the same as that of the comment moves with it. Move the frame where you want to locate the comment.
- 5 If you want to locate the comment to the new position, press <Set>;
If you do not want to move the comment, press <Back>.

■ To move an arrow

- 1 Enter the comment status.
- 2 Move the cursor onto the arrow to be moved. The cursor changes to “”.
- 3 Press <Set>. The selected arrow has a frame.
- 4 Turn the trackball to move the arrow where you want.
- 5 Press <Set>.

9.4 Editing Comments

- To edit a comment (excluding arrow)
 - 1 Enter the comment status.
 - 2 Move the cursor onto the comment to be edited. The cursor changes to “↔”.
 - 3 Press <Set>. The selected comment has a gray background.
 - 4 Press <Set> again. The comment has a white background and can be edited.
 - 5 Press <→> or <←> to move the cursor where you want. Then input new comment from the keyboard or comment library, or delete the characters on the right of the cursor.
 - 6 If you want to adopt the new comment, press <Set>;
If you want to adopt the new comment and put the cursor to the next line, press <ENTER>.

- To change the orientation of an arrow
 - 1 Enter the comment status.
 - 2 Move the cursor onto the arrow to be modified. The cursor changes to “↔”.
 - 3 Press <Set>. The selected arrow has a frame.
 - 4 Press <→>, <←>, <↑> or <↓> to adjust the orientation of arrow (pressing <→> or <↓> can rotate the arrow clockwise; pressing <←> or <↑> can rotate the arrow counterclockwise).
 - 5 Press <Set>.

9.5 Deleting Comments

9.5.1 Deleting All Comments

- First method to delete all comment (including arrows)
 - 1 Press <Clear> to clear all comments (including arrows), body mark, measurement calipers and general measurement data on the screen.

- Second method to delete all comments (including arrows)
 - 1 Enter the comment status.
 - 2 If no comments (including arrows) are being edited or selected, press to clear all comments (including arrows) on the screen.

9.5.2 Deleting One Comment

- To delete the latest comment (including arrow)
 - 1 Enter the comment status.
 - 2 If no comments (including arrows) are being edited or selected, press <Back> to delete the latest comment (including arrow).

- To delete the select comment (excluding arrow)
 - 1 Enter the comment status.
 - 2 Move the cursor onto the comment to be deleted. The cursor changes to “”.
 - 3 Press <Set>. The selected comment has a gray background.
 - 4 If you want to delete the selected comment, press ;
If you do not want to delete the selected comment, press <Back>.

- To delete the selected arrow
 - 1 Enter the comment status.
 - 2 Move the cursor onto the arrow to be deleted. The cursor changes to “”.
 - 3 Press <Set>. The selected arrow has a frame.
 - 4 If you want to delete the selected arrow, press or <Back>;
If you do not want to delete the selected arrow, press <Set>.

9.6 Exiting Comment Status

- 1 After all operations of comment are completed, you can exit the comment status by
 - Pressing <Comment> or <Exit>.
 - Or, directly pressing another key such as <Measure>, <BodyMark> or <File>.

10 Body Mark

This chapter introduces how to add, move and clear the body mark.

⚠WARNING: Be sure to add correct body mark. Otherwise, misdiagnosis may occur.

The body mark indicates the body position on which the scan is performed and the transducer orientation to interpret the image.

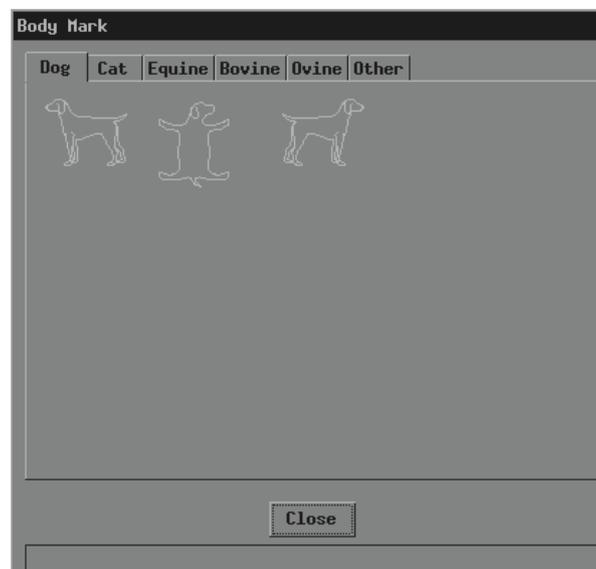
10.1 Adding/changing Body Mark

You can add body marks on real-time, frozen and cine images, on opened FRM, CIN files, and on their zoomed images.

You can add a body mark in any image mode.

In the M/B mode, the body mark is added only on the B image. In the B/B mode, while the body mark can be added on both windows respectively, it can be added only on the active window at a time.

- To add a body mark on the current image or change the current body mark on the image to another
- 1 Press <BodyMark>. The [Body Mark] dialog box pops up and the page corresponding to the current animal species is displayed.



- 2 If you do not want to add any body mark, click [Close] or press <BodyMark> or press <Exit> to close the dialog box. No body mark appears on the image. The operation is over.

If the body mark you want is not in the current page, enter other pages to find it and then go to the next step.

- 3 Move the cursor onto the body mark you want. The body mark protrudes.

- 4 Press <Set> to close the [Body Mark] dialog box. The body mark appears on the lower left corner of screen.
- 5 If you want to change the orientation of transducer symbol, press <→>, <←>, <↑> or <↓> (pressing <→> or <↓> can rotate the transducer symbol clockwise; pressing <←> or <↑> can rotate the transducer symbol counterclockwise).
- 6 If you want to change the location of transducer symbol, turn the trackball to move the transducer symbol to the place you want.
- 7 Press <Set> or <BodyMark> or <Exit>.

10.2 Moving Body Mark

- 1 Ensure it is not in the comment status, measurement status or manual cine.
- 2 Move the cursor onto the body mark on the screen. The cursor changes to “”.
- 3 Press <Set> and a frame appears around the body mark.
- 4 Turn the trackball and the frame moves with it. Move the frame where you want the body mark to be located.
- 5 If you want to move the body mark to the new position, press <Set>;
If you do not want to move the body mark, press <Back>.

10.3 Clearing Body Mark

- First method to clear the body mark
 - 1 Press <Clear> to clear all of the body mark(s), comments (including arrows), measurement calipers and general measurement data.
Note that in the B/B mode, both body marks are cleared.
- Second method to clear the body mark
 - 1 Press <BodyMark> twice successively to clear the body mark.
Note that in the B/B mode, only the body mark in the active window is cleared.

11 File System

This chapter introduces the file system and its operation.

The file system saves image data to files in a storage device after the image is frozen and manages the files.

The system supports the following file formats.

- Screen file (BMP)
- Screen file (JPG)
- Cine file (CIN)
- Frame file (FRM)
- Multimedia file (AVI)
- DICOM file (DCM) (only the system configuring DICOM supports this format)

The screen file is the copy of current screen information and saves all information on the screen. It can be browsed on a PC.

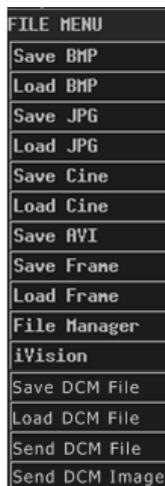
The JPEG compression method may cause distortion of images.

The AVI file records successive screen files.

- Cine images can be saved as an AVI file;
- Loaded CIN or FRM files can be saved as an AVI file.
- The system does not support the load of AVI files.
- When an AVI file is played in the Windows system, it is the auto cine with the slowest speed before the AVI file is saved.

11.1 Entering File System

- 1 Press <File> and the [FILE MENU] menu is displayed (if no menu is displayed, press <Menu>).

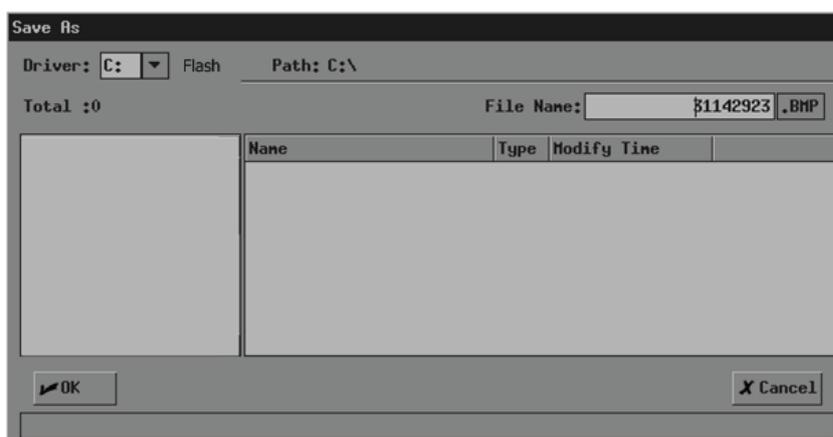


11.2 Saving Files

You can save image files to a storage device.

The following procedure describes the saving of a BMP file. The saving of files with other formats is similar to it and not described in this manual (note that the saving of DCM files is only available in the system configuring DICOM).

- 1 Freeze the image. If necessary, review images until the image to be saved is displayed on the screen.
- 2 Press <File> and the [FILE MENU] menu is displayed (if no menu is displayed, press <Menu>).
- 3 In the [FILE MENU] menu, click [Save BMP]. The [Save As] dialog box pops up.



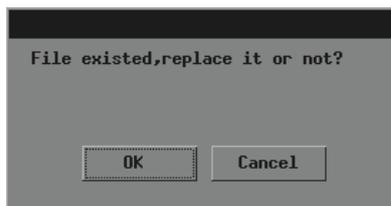
In the dialog box, the default directory to save the file and the default file name are displayed.

- 4 If you want to change the directory to save the file, perform the following steps.
 - (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 5 If you want to modify the file name, input the new file name in [File Name:]. The file type (BMP) cannot be modified.

If you want to replace an existing file, move the cursor onto the file in the file list and then press <Set>.

- 6 If you want to save the current screen information, click [OK]; if you want to save nothing, click [Cancel] or press <Exit>.

If you have selected to replace an existing file, the following dialog box pops up.



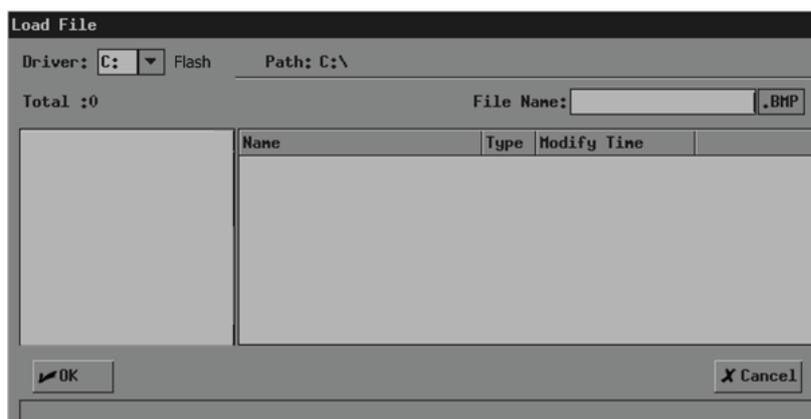
If you want to replace the existing file with the current image, click [OK]; if you do not want to replace the existing file, click [Cancel] and the current image is not saved.

11.3 Opening Files

You can open and browse the image files in a storage device.

The following procedure describes the opening of a BMP file. The saving of files with other formats is similar to it and not described in this manual (note that the opening of DCM files is only available in the system configuring DICOM).

- 1 Enter the [FILE MENU] menu.
- 2 In the [FILE MENU] menu, click [Load BMP]. The [Load File] dialog box pops up.

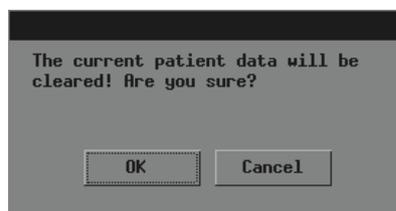


In the dialog box, the default directory is displayed.

- 3 If the file you want to open is not in the current directory, perform the following steps to select the directory.
 - (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.

- 4 Load the file you want to the screen and close the [Load File] dialog box by
 - Moving the cursor onto the file you want in the file list and then pressing <Set> twice successively.
 - Or, moving the cursor onto the file you want in the file list, pressing <Set>, and then clicking [OK].

Note that the system prompts if the current animal information is to be deleted before a CIN or FRM file is opened, shown in the dialog box below.



If you want to delete the current animal information and open the selected CIN or FRM file, click [OK]; if you do not want to delete the current animal information, click [Cancel] and no image file is opened.

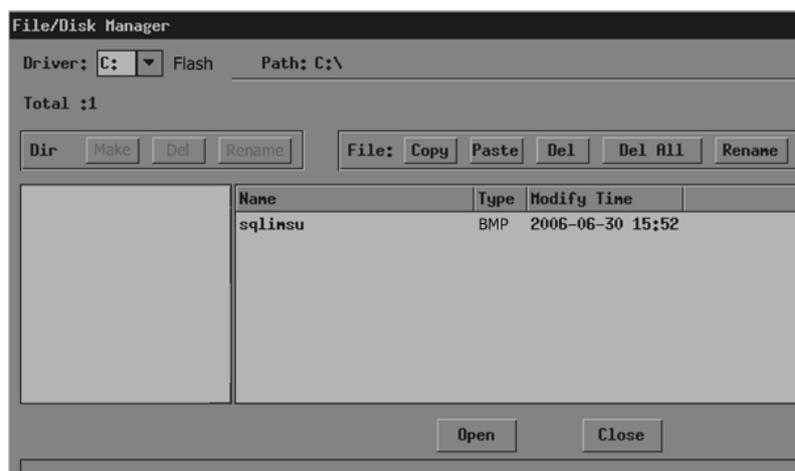
- 5 You can click [Exit] on the lower right corner of screen or press <Exit> to close the loaded file (this only applies to BMP, JPG and DCM files).

Note that during the steps above, you can click [Cancel] in the [Load File] dialog box or press <Exit> to close the dialog box and open none of files.

11.4 File/directory Management

You can manage directories and files in the Flash memory and USB storage device.

- 1 Enter the [FILE MENU] menu.
- 2 In the [FILE MENU] menu, click [File Manager]. The [File/Disk Manager] dialog box pops up.



In the dialog box, the default directory is displayed.

- 3 You can manage files and directories in the [File/Disk Manager] dialog box. See "11.4.1 Directory Management" and "11.4.2 File Management" for details.
- 4 You can follow the steps below to open files in the [File/Disk Manager] dialog box.
 - (1) Follow the step 3 in "11.3 Opening Files" to operate.
 - (2) Select the file to be opened in the file list.

- (3) Click [Open].
- 5 After all operations are completed, click [Close] or press <Exit> to close the [File/Disk Manager] dialog box.

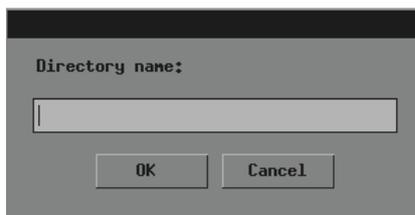
11.4.1 Directory Management

You can create, rename and delete directories only in the USB storage device.

Note that the Flash memory has no directory.

■ To create a directory

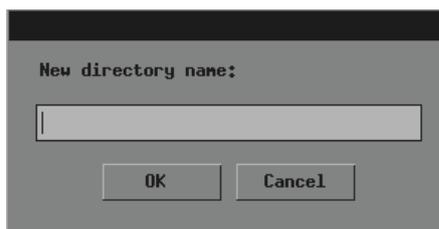
- 1 If the directory to be created is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver (except the driver C) in [Driver:].
 - (2) Move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Click [Make] and the following dialog box pops up.



- 3 Input the directory name in the dialog box.
- 4 If you want to create the directory, click [OK]; if you do not want to create any directory, click [Cancel] or press <Exit>.

■ To rename a directory

- 1 If the directory to be renamed is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver (except the driver C) in [Driver:].
 - (2) Move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Select the directory to be renamed in the directory list.
- 3 Click [Rename] in the left part of dialog box and the following dialog box pops up.

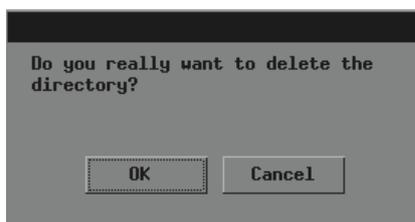


- 4 Input the new directory name in the dialog box.

- 5 If you want to rename the directory with the new name, click [OK]; if you do not want to modify the directory name, click [Cancel] or press <Exit>.

■ To delete a directory

- 1 If the directory to be deleted is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver (except the driver C) in [Driver:].
 - (2) Move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Select the directory to be deleted in the directory list.
- 3 Click [Del] in the left part of dialog box and the following dialog box pops up.



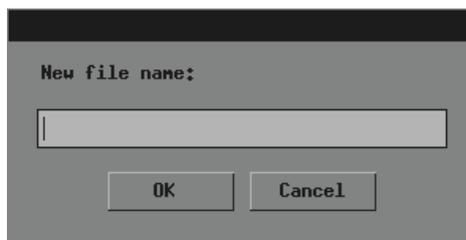
- 4 If you want to delete the selected directory, click [OK]; if you want to delete nothing, click [Cancel] or press <Exit>.

11.4.2 File Management

You can copy, rename and delete a file in the Flash memory and USB storage device.

■ To rename a file

- 1 If the file to be renamed is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Select the file to be renamed in the file list.
- 3 Click [Rename] in the right part of dialog box and the following dialog box pops up.

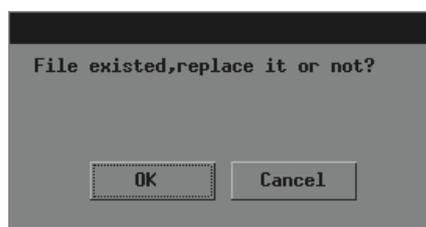


- 4 Input new file name in the dialog box.

- 5 If you want to rename the file with the new name, click [OK]; if you do not want to modify the file name, click [Cancel] or press <Exit>.

■ To copy a file

- 1 If the file to be copied is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Select the file to be copied in the file list.
- 3 Click [Copy].
- 4 If the destination directory to which the selected file is copied is not the current one, follow the substeps in the step 1 to select it.
- 5 Click [Paste] and one of the following conditions will occur:
 - (1) The selected file is copied to the current directory.
 - (2) If a file whose name is the same as the selected one exists in the current directory, the following dialog box pops up.

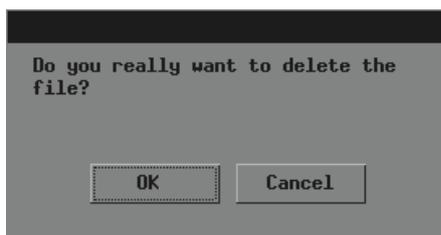


If you want to replace the file in the current directory with the selected one, click [OK]; if you do not want to replace the file in the current directory, click [Cancel] and the selected file is not copied.

■ To delete one file

- 1 If the file to be deleted is not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.
 - (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.
- 2 Select the file to be deleted in the file list.

- 3 Click [Del] in the right part of dialog box and the following dialog box pops up.



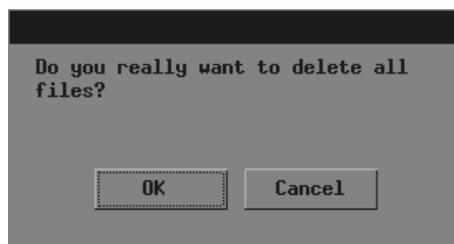
- 4 If you want to delete the selected file, click [OK]; if you want to delete nothing, click [Cancel] or press <Exit>.

■ To delete all files in a directory

- 1 If the files to be deleted are not in the current directory, perform the following steps in the [File/Disk Manager] dialog box.

- (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
- (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [..] and then press <Set> twice successively.

- 2 Click [Del All] and the following dialog box pops up.

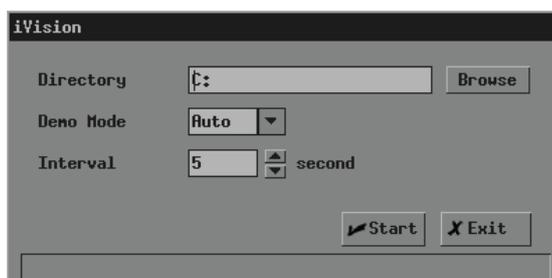


- 3 If you want to delete all files in the current directory, click [OK]; if you want to delete nothing, click [Cancel] or press <Exit>.

11.5 iVision

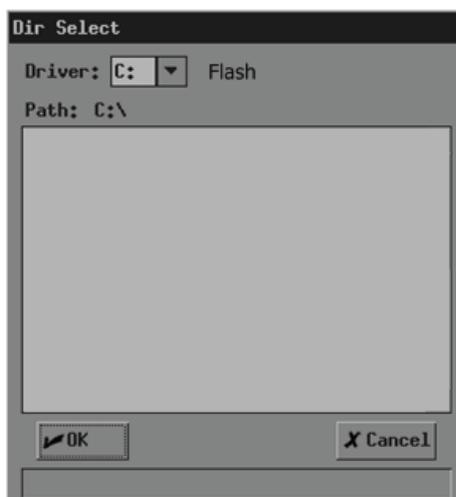
iVision is the function of image demonstration, which plays image files (excluding AVI files) image by image.

- 1 Enter the [FILE MENU] menu.
- 2 In the [FILE MENU] menu, select [iVision]. The [iVision] dialog box pops up.



In the dialog box, the default directory is displayed.

- 3 If demo files are not in the current directory, click [Browse]. The [Dir Select] dialog box pops up.



- (1) Select the driver in [Driver:]. The Flash memory in the system is the driver C, and the remaining driver(s) belong(s) to the USB storage device if a USB storage device is connected.
 - (2) If the USB storage device is selected in the previous step, move the cursor onto the item you want in the directory list and then press <Set> twice successively to enter the directory. If you want to return to the parent directory, move the cursor onto [...] and then press <Set> twice successively.
 - (3) If you want to enter the selected directory, click [OK]; if you do not want to enter the selected directory, click [Cancel] or press <Exit>.
- 4 Select "Auto" or "Manual" in [Demo Mode].

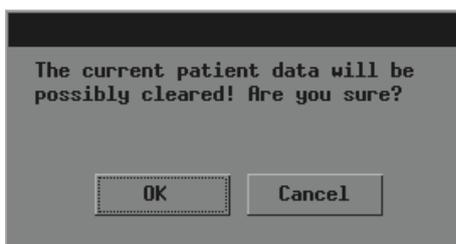
"Auto" means the system automatically plays image files with the set time interval.

- The image files are circularly played in the sequence of file storage;
- Time intervals of files are the same;
- If the files are CIN files, auto cine is performed.

"Manual" means the image files are played manually.

- Press <→> or <←> to play image files.
- If the files are CIN files, manual cine is performed. Turn the trackball to review.

- 5 If "Auto" is selected, set time interval in [Interval] (the range is 0-500 seconds).
- 6 If you want to start the demo, click [Start] and the demo starts or if the files to be played include CIN or FRM files, the following dialog box pops up; if you do not want to start the demo, click [Exit] or press <Exit>.



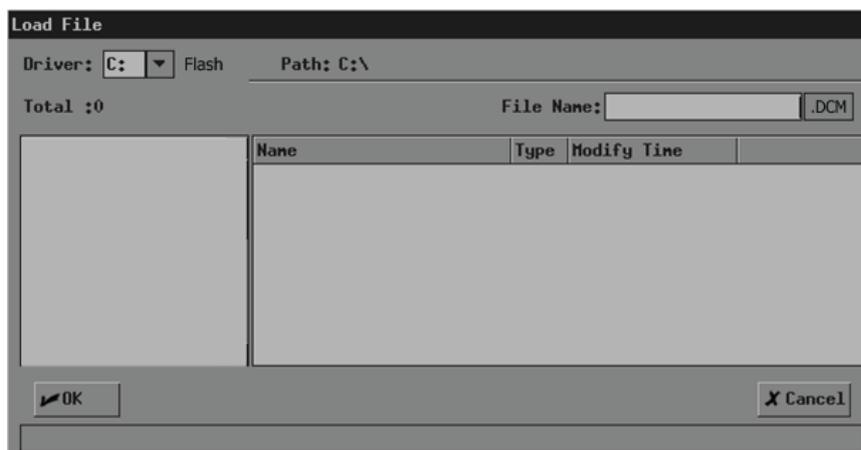
If you want to start the demo, click [OK] in the dialog box and the system deletes the current animal information and starts the demo; if you do not want to delete the current animal information, click [Cancel] and the system neither deletes the current animal information nor starts the demo.

- 7 During the demo, you can press <Exit> to end the demo.

11.6 Sending DCM Files

Only the system configuring DICOM can send DCM files in the Flash memory or USB storage device to the current server.

- 1 Enter the [FILE MENU] menu.
- 2 In the [FILE MENU] menu, click [Send DCM File]. The [Load File] dialog box pops up.



- 3 Follow the steps 3 and 4 in “11.3 Opening Files” to operate.
- 4 “Transmitting...” is displayed at the lower part of screen. After the file is sent, the system will prompt the successful transmitting.

11.7 Sending DCM Images

Only the system configuring DICOM can send the current image to the current server.

- 1 Freeze the image. If necessary, review images until the image to be sent is displayed on the screen.
- 2 Press <File> and the [FILE MENU] menu is displayed (if no menu is displayed, press <Menu>).
- 3 In the [FILE MENU] menu, click [Send DCM Image]. The system starts to send the current image to the server.
- 4 “Transmitting...” is displayed at the lower part of screen. After the image is sent, the system will prompt the successful transmitting.

11.8 Exiting File System

- 1 After all operations to the file system are completed, press <File> or <Exit> to exit the file system.

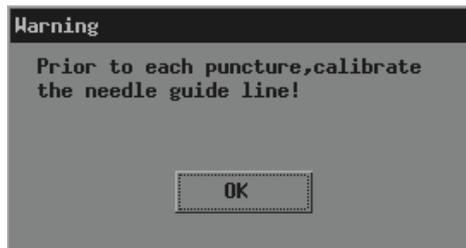
12 Needle Guide

This chapter introduces operations about needle guide.

⚠WARNING: Adjust the guide line before each puncture.
If the positions of the needle and guide line are not consistent, do not perform puncture.
During the puncture, the image must be real-time and cannot be frozen.
Refer to the transducer's manual for details on puncture.

12.1 Entering Status of Guide Line Adjustment

- 1 When the B image is real-time, select [Puncture] in the [B MODE MENU] menu.
If the transducer does not support the needle guide, "This transducer has no biopsy kit!" is displayed and the operation is over;
If the transducer supports the needle guide, the following dialog box pops up.



- 2 Click [OK] in the dialog box. The [NEEDLE GUIDE] menu and guide lines appear.



Each needle-guided bracket has three guide lines at most.

- When the image depth is between 2.16cm and 8cm, interval of two adjacent dots is 0.5cm;
- When the image depth is between 8cm and 24.8cm, interval of two adjacent dots is 1cm.

12.2 Selecting Guide Line

- 1 Enter the status of guide line adjustment.
- 2 In the [NEEDLE GUIDE] menu, select the guide line you want in [GuideLine]. In it, "All" represents all guide lines.

12.3 Adjusting Guide Line

NOTE:	Guide lines can only be adjusted on real-time B images.
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- To move a guide line horizontally
 - 1 Enter the status of needle guide adjustment.
 - 2 In the [NEEDLE GUIDE] menu, select a guide line in [GuideLine].
 - 3 Adjust [Set Posi] in the [NEEDLE GUIDE] menu to move the selected guide line horizontally.

- To adjust the angle of a guide line
 - 1 Enter the status of needle guide adjustment.
 - 2 In the [NEEDLE GUIDE] menu, select a guide line in [GuideLine].
 - 3 Adjust [Set Angle] in the [NEEDLE GUIDE] menu to change the angle of selected guide line.

- To restore factory settings of all guide lines
 - 1 Enter the status of needle guide adjustment.
 - 2 Click [Load Factory] in the [NEEDLE GUIDE] menu to restore positions and angles of all guide lines to factory settings.

- To save settings of all guide lines
 - 1 Enter the status of needle guide adjustment.
 - 2 Adjust positions and angles of guide lines if necessary.
 - 3 Click [Verify] in the [NEEDLE GUIDE] menu and the system saves current data of positions and angles of all guide lines.
After <Patient> is pressed or the system starts up again, the positions and angles of all guide lines use the saved data.

12.4 Displaying/hiding Guide Line

- 1 Enter the status of needle guide adjustment.
- 2 Set [Display] in the [NEEDLE GUIDE] menu to display or hide the guide line(s).
In it, “√” represents displaying the guide line(s) and “x” represents hiding the guide line(s).

12.5 Exiting Status of Guide Line Adjustment

- 1 You can exit the status of guide line adjustment by:
 - Clicking [Return] in the [NEEDLE GUIDE] menu or pressing <Exit>.
 - Or, directly pressing another key such as <Measure>, <Comment>, <BodyMark> or <File>.

After the status of guide line adjustment exits, the guide line(s) is displayed until <Patient> is pressed but cannot be adjusted.

13 System Maintenance

This chapter introduces the system maintenance and simple troubleshooting.

⚠WARNING: The system maintenance is completed by the user and the service engineer. After the system is delivered to the user, the user assumes all the responsibilities in maintenance and operation.

For problems not described in this chapter or unable to be solved, contact our company's Customer Service Department or your local distributor.

NOTE: It is recommended to establish maintenance and periodic check plans. If finding any abnormality, contact our company's Customer Service Department or your local distributor.

13.1 Maintenance Performed by Users

The following maintenance is performed by users.

13.1.1 Cleaning

⚠WARNING: Before cleaning, turn off the system and disconnect its power plug from the outlet. Otherwise, electric shock may occur.

Do not leak any liquid into the system. Otherwise, the system may fail or electric shock may occur.

⚠CAUTION: Refer to the instruction of detergent for details on how to use the detergent.

NOTE: Do not clean parts such as connectors by yourself. If you want to clean them, contact our company's Customer Service Department or your local distributor.

- To clean the transducer

Refer to the transducer's manual to clean and disinfect the transducer.

- To clean the screen

Use soft cloth dipped with glass detergent to clean the screen and then air dry it.

NOTE: Do not use hydrocarbon detergent or detergent used on OA equipments to clean the screen.

- To clean the transducer holder, control panel and shell
Use soft dry cloth to clean the surface of system. If necessary, use soft cloth dipped with neutral detergent to clean it and then air dry it.

13.1.2 Backup

To prevent data saved in the flash memory of the system from being damaged or lost, backup the data in it periodically.

You can copy the files in the flash memory a USB storage device and then save the files in proper external storage media. See “To copy a file” in “11.4.2 File Management” for details.

13.2 Maintenance Performed by Service Engineers

The following maintenance is to assure the performance and safety of the system. Only professional service engineers can perform them. Contact our company's Customer Service Department or your local distributor to perform the maintenance.

Category	Maintenance Item
Cleaning	Interior of the system Peripherals
Electric safety	Earthing impedance Earth leakage current Enclosure leakage current Patient leakage current Patient leakage current (Mains voltage on the applied part)
Mechanical safety	Control panel Mounting mechanism of peripherals Other mechanical parts Transducer appearance
Image	Images in each mode Images obtained from standard transducers

13.3 Troubleshooting

The following troubleshooting can be performed by users.

If any failure listed in the table below occurs, follow the measure in the table to troubleshoot it. If you cannot restore the system from the failure after performing the measure, contact our company's Customer Service Department or your local distributor.

Failure	Measure
The system does not work after it is powered on.	After turning off the system, perform the following checks: <ol style="list-style-type: none"> 1. Check if the power cable is connected to the outlet. 2. Check if the power supply is normal. Turn on the system again.
The system works but the screen does not display.	<ol style="list-style-type: none"> 1. Turn the brightness knob and contrast knob to adjust the brightness and contrast of screen. 2. If the screen still displays nothing, turn off the system and then turn it on again (after turning off the system, wait at least 10 seconds before tuning it on again).

Failure	Measure
The screen displays characters but no images.	<ol style="list-style-type: none">1. Check if the transducer is connected to the system properly.2. If the image is frozen, unfreeze it.3. Turn the gain knob or press TGC keys.4. If the screen still displays no images, turn off the system and then turn it on again (after turning off the system, wait at least 10 seconds before turning it on again).
The image is abnormal.	<ol style="list-style-type: none">1. Select a proper exam mode.2. Adjust the image.
The screen displays abnormally.	Turn off the system and then turn it on again (after turning off the system, wait at least 10 seconds before turning it on again).
An error message displays on the screen and always displays.	Turn off the system and then turn it on again (after turning off the system, wait at least 10 seconds before turning it on again).
An operation cannot be performed.	Turn off the system and then turn it on again (after turning off the system, wait at least 10 seconds before turning it on again).

14 Acoustic Power Principle

14.1 Concerns with Bioeffects

Diagnostic ultrasound is recognized as being safe. In fact, there have been no reports of injuries caused by diagnostic ultrasound. Studies have revealed that ultrasound with extremely high intensity is harmful to body tissues and has potential risk of bioeffects to bodies.

14.2 Prudent Use Statement

For the potential risk of bioeffects, use ultrasound in a prudent manner to provide medical benefit to the patient. Avoid high exposure levels and long exposure times while acquiring necessary clinical information.

14.3 ALARA

It is required to practice ALARA (As Low As Reasonably Achievable) when using ultrasound energy. Practicing ALARA ensures that the total energy level is controlled below a low enough level at which bioeffects are not generated while diagnostic information is being accumulated. The total energy is controlled by output intensity and total radiation time. The output intensity necessary for examinations differs depending on the patient and the clinical case.

Not all examinations can be performed with an extremely low level of acoustic energy. Controlling the acoustic level at an extremely low level leads to low-quality images or insufficient Doppler signals, adversely affecting the reliability of the diagnosis. However, increasing the acoustic power more than necessary does not always contribute to an increase in quality of information required for diagnosis, rather increasing the risk of generating bioeffects.

Users must take responsibility for the safety of patients and utilize ultrasound deliberately. Deliberate use of ultrasound means that output power of ultrasound must be selected based on ALARA.

14.4 Derated Ultrasonic Output Parameters

In order to determine the relevant Ultrasonic Output Parameters, a method is used which allows for the comparison of ultrasound systems which operate at different frequencies and are focused at different depths. This approach, called "derating" or "attenuating", adjusts the acoustic output as measured in a water tank to account for the effect of ultrasound propagation through tissue. By convention, a specific average intensity attenuation value is used, which corresponds to a loss of 0.3 dB/cm/MHz. That is, the intensity of ultrasound will be reduced by 0.3 dB/MHz for every centimeter of travel from the transducer. This can be expressed by the following equation:

$$I_{\text{atten}} = I_{\text{water}} \times 10^{(-0.3/10 \times f_c \times z)}$$

Where I_{atten} is the attenuated intensity, I_{water} is the intensity measured in a water tank (at distance z), f_c is the center frequency of the ultrasound wave (as measured in water), and z is the distance from the transducer. The equation for attenuating pressure values is similar except that the attenuation coefficient is 0.15 dB/cm/MHz, or one-half the intensity coefficient. The intensity coefficient is double the pressure coefficient because intensity is proportional to

the square of pressure.

Although the attenuation coefficient chosen, 0.3 dB/cm/MHz, is significantly lower than any specific solid tissue in the body, this value was chosen to account for fetal examinations. In early trimester ultrasound fetal examinations, there may be a significant fluid path between the transducer and the fetus, and the attenuation of fluid is very small. Therefore the attenuation coefficient was lowered to account for this case.

It was verified that the MI and TI values didn't exceed 1.0 in each exam mode.

14.5 Measurement Uncertainty

Total Uncertainty for Mechanical Index	16.4 %		
	Non-scan Mode	Scan-Mode	Combined-Mode
Total Uncertainty for TIS	32.9%	5.1%	32.9% or 5.1% ($A_{\text{aprt}} > 1$)
			33.4% ($A_{\text{aprt}} \leq 1$)
Total Uncertainty for TIB	32.9%	5.1%	32.9% or 5.1%
Total Uncertainty for TIC	32.9%	5.1%	33.4%

14.6 Parameters Affecting Acoustic Power

Acoustic Power is affected by transmission conditions (focus, drive frequency, voltage applied to piezoelectric elements, etc.), scan conditions, settings, etc.

14.7 Imaging Functions Changing Acoustic Output Power

Changes of imaging mode and adjustments to controls also affect the acoustic output power. Specific information is provided in the following table.

Operation	Effect on the acoustic output power
Transducer change	The acoustic output power will change as the operator changes the active transducer.
Imaging Mode change	Since B and M modes use different default imaging parameters, changing the mode will change the acoustic output power of the system. No changes occur when switching from B to B/B, since the basic imaging parameters remain the same. In most cases, the acoustic output power for M-mode is larger than in B-mode.
Field of view (sector Angle or scan Width)	Change the sector angle or scan width may result in change to the frame rate, and thus change the acoustic output power.
Image depth change	Changing the image depth changes the PRF, and thus changes the acoustic output power.
Number of focuses	Since the number of focuses influences the frame rate and the actual position of the focuses, changing the number of focuses changes the acoustic output power.
Focus location	The transmit focus location change will cause the acoustic output power change, even though the transmitting electrical energy level and the aperture remains the same. In most cases, the acoustic output power will increase if the focus is moved closer to the transducer.

Operation	Effect on the acoustic output power
Freeze	Active the freeze function stops the electrical energy transmit part of the system, thus disabling the system from generating ultrasound wave.
Transmit power	The transmit power level change will change the electrical output of the system to the transducer, and thus change the acoustic output power.
Frequency change	Changing the operating frequency changes the focal characteristics of the acoustic waves, thus changes the acoustic output power.
Line density	Changing the number of acoustic lines generated (line density) affects the acoustic output power.
Preset	Since the system and user presets contain all of the above imaging parameters, changing the preset will change the acoustic output power.
Reset or Power Off/On	Resetting or turning on/off the system causes the system to return to the default status thus may change the acoustic output power.

14.8 References for Acoustic Power and Safety

- 1 "Bioeffects and Safety of Diagnostic Ultrasound" issued by AIUM in 1993
- 2 "Medical Ultrasound Safety" issued by AIUM in 1994

Appendix A System Configuration

A.1 Basic Configuration

- Main unit
- Accessories (see the package list for details)

A.2 Options

- Transducers
- Dual-transducer socket
- DICOM3.0 software
- Footswitch: 971-SWNOM
- Bag
- Trolley
- AC mobile power: DA-88

A.3 Optional Transducers

Model	Intended Use	Applied Region
35C50EB	Gynecology and obstetric, abdomen, pediatrics	Body surface
65EC10EB	Gynecology and obstetric, urology	Transvaginal, transrectal
75L38EB	Small parts, neonatal cephalic, peripheral vascular, musculoskeletal (conventional and superficial)	Body surface
75L60EA	Small parts, neonatal cephalic, peripheral vascular, musculoskeletal (conventional and superficial)	Body surface
35C20EA	Gynecology and obstetric, abdomen, pediatrics, cardiac	Body surface
65C15EAV	Pediatrics, neonatal cephalic; cardiac and abdomen for small animals	Body surface
75L50EAV	Transrectal for animals	Transrectal
50L60EAV	Transrectal for animals	Transrectal

A.4 Peripherals

- USB storage device
- Video printer
- Graph/text printer

The system supports the USB storage devices using FAT16 or FAT32 file format and SCSI instructions.

The system supports the following video printers:

- SONY UP-895MD
- SONY UP-897MD
- MITSUBISHI P93W

The system supports the following graph/text printers:

- HP DeskJet 5652/5650/3820/1280 (USB port)
- Business Inkjet 1200 (USB port)
- HP LaserJet2420d (USB port)
- HP DeskJet6548 (USB port)

Appendix B Specifications

B.1 Image Mode

The system supports the following image modes:

- B
- M
- B/B
- M/B

B.2 Power Supply

- Voltage: 100-240VAC
- Frequency: 50/60 Hz
- Power: 100-240VAC 1.5-0.8A
- Fuse: 250VAC T4AL

B.3 Environment Conditions

B.3.1 Operating Environment

- Ambient temperature: 5°C-40°C
- Relative humidity: 35%-85% (no condensation)
- Atmospheric pressure: 700hPa-1060hPa

B.3.2 Storage and Transportation Environment

- Ambient temperature: -20°C-55°C
- Relative humidity: 30%-85% (no condensation)
- Atmospheric pressure: 700hPa-1060hPa

B.4 Size and Weight

- Size (excluding handle and transducer holder): 360mm×320mm×270mm (L×W×H)
- Weight (excluding optional parts): approx. 9.6 kg

Appendix C Measurement Accuracy

Scale error range

Parameter	Error
Image depth range	Between -4% and +4% of full scale
Time range of M images	Between -0.3% and +0.3% of full scale

Measurement error range of two-dimensional images

Parameter	Error
Distance/depth	Between -4% and +4%, or when the measured value is less than 40mm, less than 2mm
Area	Between -8% and +8%, or when the measured value is less than 1600mm ² , less than 130 mm ²
Trace (ellipse, round)	Between -8% and +8%, or when the measured value is less than 1600mm ² , less than 130 mm ²
Angle	Between -3% and +3%

Error range of time/motion measurement

Parameter	Error
Distance	Between -4% and +4%, or when the measured value is less than 40mm, less than 2mm
Time	Between -1% and +1%
Heart rate	Between -5% and +5%
Speed	Between -5% and +5%

Error range of volume measurement

Parameter	Error
Volume	Between -12% and +12%, or when the measured value is less than 64000mm ³ , less than 8000mm ³

NOTE:	Within the selected field range, the measurement accuracy is ensured within the range mentioned above. The accuracy specifications are performance in the worst conditions, or based on the real test for the system, regardless of acoustic speed error.
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Appendix D Guidance and Manufacturer's Declaration

The system complies with the EMC standard IEC60601-1-2: 2001+A1:2004.

⚠WARNING: The use of unapproved accessories may diminish system performance.

NOTE: Use of accessories, transducers, and cables other than those specified may result in increased emission or decreased immunity of system.

The system should not be used adjacent to or stacked with other equipment. If adjacent or tacked use is necessary, system should be observed to verify normal operation in the configuration in which it will be used.

The system needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided below.

Preventing conducted RF immunity. Due to technological limitations, the conducted RF immunity level are limited to 1Vrms level, conducted RF interference above 1Vrms may cause wrong diagnosis and measurements. We suggest that you position system further from sources of conducted RF noise.

Operation of system, in the case that the patient physiological signal is lower than the minimum amplitude or value specified in the product specifications, may cause inaccurate results.

Portable and mobile RF communications equipment can affects system. See tables 1, 2, 3, and 4 below.

TABLE 1

GUIDANCE AND DECLARATION—ELECTROMAGNETIC EMISSIONS		
The system is intended for use in the electromagnetic environment specified below. The customer or the user of system should assure that it is used in such an environment.		
EMISSIONS TEST	COMPLIANCE	ELECTROMAGNETIC ENVIROMENT— GUIDANCE
RF emissions CISPR 11	Group1	The system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	system is suitable for use in all establishments including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes
Harmonic Emissions IEC61000-3-2	Class A	
Voltage Fluctuations/Flicker Emissions IEC61000-3-3	Compliance	

TABLE 2

GUIDANCE AND DECLARATION—ELECTROMAGNETIC IMMUNITY

The system is intended for use in the electromagnetic environment specified below. The customer or the user of system should assure that it is used in such an environment.

IMMUNITY TEST	IEC 60601 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT-GUIDANCE
Electrostatic Discharge(ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast Transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV line(s) to line(s) ±2 kV line(s) to earth	±1 kV line(s) to line(s) ±2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, Short interruptions and voltage variation on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (>95% dip in U_T) for 5 sec	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycle 70% U_T (30% dip in U_T) for 25 cycle <5% U_T (>95% dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If you require continued operation during power mains interruptions, it is recommended that our product be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 HZ) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

NOTE: U_T is the A.C. mains voltage prior to application of the test level.

TABLE 3

GUIDANCE AND DECLARATION—ELECTROMAGNETIC IMMUNITY			
The system is intended for use in the electromagnetic environment specified below. The customer or the user of system should assure that it is used in such an environment.			
IMMUNITY TEST	IEC 60601-1-2 TEST LEVEL	COMPLIANCE LEVEL	ELECTROMAGNETIC ENVIRONMENT-GUIDANCE
Conducted RF IEC 1000-4-6	3 Vrms 150kHz to 80MHz	1 Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended separation distance</p> $d = 3.5 \times \sqrt{P}$ $d = 1.2 \times \sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz}$ $d = 2.3 \times \sqrt{P} \quad 800 \text{ MHz to } 2.5\text{GHz}$ <p>where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).b</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a should be less than the compliance level in each frequency range b</p> <p>Interference may occur in the vicinity of equipment marked with the following</p> <p>symbol: </p>
Radiated RF IEC 1000-4-3	3 V/m 80MHz to 2.5 GHz	3V/m	

Note 1 At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which system is used exceeds the applicable RF compliance level above, system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating system.
- Over the frequency ranges 150kHz to 80MHz, field strengths should be less than 1V/m.

TABLE 4

RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATION AND system

The system is intended for use in an electromagnetic environment in which radiated RF disturbance are controlled. The customer or the user of system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and system as recommended below, according to the maximum output power of the communication equipment.

Rated Maximum Output power of Transmitter W	Separation Distance According to Frequency of Transmitter m		
	150kHz -80MHz $d = 3.5\sqrt{P}$	80MHz -800MHz $d = 1.2\sqrt{P}$	800MHz -2.5GHz $d = 2.3\sqrt{P}$
0.01	0.35	0.12	0.23
0.1	1.11	0.37	0.74
1	3.50	1.17	2.34
10	11.07	3.69	7.38
100	35.00	11.67	23.34

For transmitters at a maximum output power not listed above, the recommended separation distanced in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

If system image distortion occurs, it may be necessary to position system further from sources of conducted RF noise or to install external power source filter to minimize RF noise to an acceptable level.

Note 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix E Maximum Surface Temperature of Transducers

According to the requirements of the section 42.3 in the standard EN60601-2-37: 2001+A1: 2005+A2: 2005, the transducer surface temperature has been tested in two kinds of conditions: the transducer suspended in still air or transducer contacting human-tissue mimicking material. The calculation of the expanded uncertainty is based on the ISO Guide to the Expression of uncertainty in measurement. Three transducer samples have been tested and the confidence coefficient is at 95%, the value of t_{975} is 4.30.

* The measurement data were obtained under the test conditions employed by the manufacturer.

Transducer model	Maximum surface temperature (°C) ^{*1}	Maximum surface temperature (°C) ^{*1}
	Contacting TMM	Suspending in air
35C20EA	35.0±0.81	26.2±0.59
35C50EB	35.53±0.68	27.17±0.91
65EC10EB	42.13±0.64	31.60±0.37
75L38EB	39.23±1.04	34.63±0.81
75L60EA	38.37±0.92	32.37±0.68
65C15EAV	40.50±0.90	33.70±0.90
75L50EAV	40.50±0.57	31.80±0.28
50L60EAV	40.40±1.41	33.33±3.14

*1: Values following the "±" mark indicate the expanded uncertainty with a confidence level of 95%, $t_{975} = 4.30$.

Appendix F Safety Classification

1. According to the type of protection against electric shock: CLASS I EQUIPMENT
2. According to the degree of protection against electric shock: EQUIPMENT WITH TYPE-BF APPLIED PARTS
3. According to the degree of protection against harmful ingress of water: IPX0 (for the main unit); IPX7 (for the transducers)
4. According to the degree of safety of application in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE: EQUIPMENT not suitable for use in the presence of a FLAMMABLE ANESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE
5. According to the mode of operation: CONTINUOUS OPERATION
6. According to the Degree of Mobility: PORTABLE EQUIPMENT

Appendix G Input of Characters

This appendix describes how to input characters from the keyboard.

- To input characters

Press keys on the keyboard to input characters.

Pressing <CAPS> can switch between the uppercase and lowercase. For example, if the current letters are lowercase, press <CAPS> and then press letter keys. You can see the input letters become uppercase.

- Other rules

To input a character shown in the upper part of a key, keep pressing <SHIFT> and press the key. For example, to input “ $\frac{\circ}{+}$ ” in the upper part of the “Q” key, keep pressing <SHIFT> and then press <Q>.

To input a blank, press <SPACE>.

During the input, to insert a character among the characters already input, press <→> or <←> to move the cursor where the character is to be inserted, and then input the character.

During the input, to delete a character already input, press <→> or <←> to move the cursor to the right of the character to be deleted, and then press .

